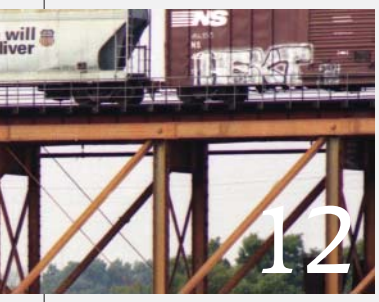
Amber Waves

contents

SEPTEMBER 2005 • VOLUME 3 • ISSUE 4
Economic Research Service/USDA



FINDINGS

FEATURES

Amber Waves **ONLINE**

www.ers.usda.gov/amberwaves/

Fred Gale, USDA/ERS

China's Food Market Revolution Reaches the Countryside

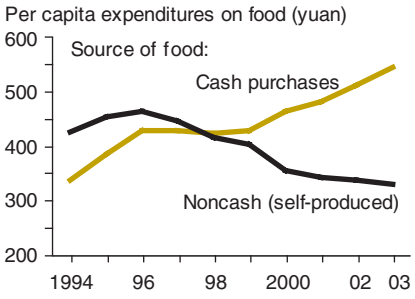
Evidence of China's thriving food industry—bustling restaurants, modern supermarkets, and glitzy hotel banquet rooms—abounds in the country's prosperous coastal cities. But to get a complete picture of food markets in the world's most populous and fastest growing country, one must take a closer look at food consumption patterns in China's vast rural hinterland—home to over 60 percent of China's 1.3-billion population.

Rural households in China grow much of the food they eat and subsist on food expenditures that averaged just $107 per person (30 cents per day) in 2003. Yet, while their low level of food expenditure suggests high poverty, China's rural population is generally not malnourished. China's rural households—historically cash-poor but with plentiful labor and an egalitarian distribution of communal land—meet most of their basic nutritional needs on a diet composed mainly of rice, wheat flour, other grains, and vegetables that they grow themselves. They consume relatively little meat, fish, dairy products, or processed food. By minimizing cash outlays on food, households can save their cash for school fees, house construction, consumer durables, and other goods and services.

While rural consumption patterns still differ sharply from those in urban areas, the last decade saw a slow but steady trend toward commercialization in rural food markets. While rural consumers' per capita purchases of food remain small in dollar value, their inflation-adjusted cash expenditures on food increased more than 70 percent during 1994-2003. The value of self-produced food consumed by rural people declined over the same period, and the cash share of rural food expenditures rose from 45 percent to over 60 percent.

The revolution that has transformed China's urban food markets is starting to spread to rural areas, as greater availability of cash income, more efficient markets, better communications, and improved transportation help bring rural people into the mainstream of the economy. Supermarkets and restaurants are opening in small towns and villages, and food product distributors are now including rural areas in their marketing plans. While there is still a long way to go, the advance of China's food revolution into rural areas promises to unify the country into a national market and substantially change the mix of foods consumed by the Chinese people.

Rural Chinese housholds now purchase more food with cash



Note: Expenditures in constant 2000 yuan, deflated with China consumer price index for food.
Source: ERS calculations based on data from China National Bureau of Statistics.

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This finding is drawn from . . .

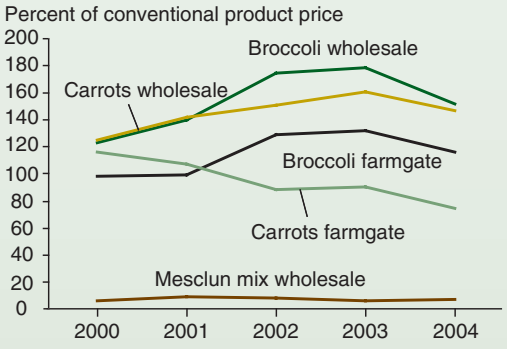
Commercialization of Food Consumption in Rural China, by Fred Gale, Ping Tang, Xianhong Bai, and Huijun Xu, ERR-8, USDA, Economic Research Service, July 2005, available at: www.ers.usda.gov/publications/err8/

Organic Price Premiums Remain High

Organic products often sell for higher prices than conventionally produced goods. The price premium results from higher production and distribution costs for organic food, as well as consumers' willingness to pay extra for organic food. As long as demand increases faster than supply and prices of conventionally produced food remain constant, organic food will continue to sell for higher prices. The price premiums and profitability earned by organic producers to date have contributed to growth in certified organic farmland and, ultimately, market expansion—organic food retail sales reached an estimated $10.3 billion in 2003, up from $3.5 billion in 1997 (retail sales estimated by the *Nutrition Business Journal*).

A recent study by ERS examined price premiums for organic broccoli, carrots, and mesclun (lettuce) mix. During 2000-04, the highest premiums (near 100 percent over conventional) were observed for broccoli and carrots, and premiums were higher at the wholesale level than at the farmgate level. Annual organic price premiums for mesclun mix at the wholesale level (farmgate prices are not

Wholesale price premiums for organic broccoli and carrots exceed 100 percent



Source: USDA, Economic Research Service.


Earthbound Farm

available) ranged from 6 to 9 percent over the 5-year period. Price premiums for organic mesclun have always been much lower than for other commodities. Mesclun, first introduced as an organic crop in the 1990s, initially sold for high prices that attracted both organic and conventional producers to the market. As the supply of organic and conventional mesclun increased, the prices of both declined, although organic products maintained a small premium.

As farmers receive higher prices for their organic products, they increase production, and attract other farmers to the organic sector. At the same time, as the price differential between organically and conventionally grown products diminishes, more consumers are likely to purchase organic food. Relative changes of supply and demand will determine whether price premiums continue for organic farmers and businesses. If supply begins to grow faster than demand, price premiums will decline. Recent trends in price premiums for broccoli and carrots suggest that even though certified organic acreage is rising rapidly, demand appears to be growing fast enough so that farmers and wholesalers are maintaining a large organic premium for these products.

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This finding is drawn from . . .

Price Premiums Hold on as U.S. Organic Produce Market Expands, by Lydia Oberholtzer, Carolyn Dimitri, and Catherine Greene, VGS-308-01, USDA, Economic Research Service, May 2005, available at: www.ers.usda.gov/publications/vgs/may05/vgs30801/ ERS Organic Farmgate and Wholesale Prices database, www.ers.usda.gov/data/organicprices/

Some Improvements Are Projected for Global Food Security

As we approach 2015, the milestone set by the World Food Summit in 1996 to reduce global hunger by half, how close are we? According to ERS projections, the number of people consuming below the nutritional requirement is estimated to decline about 27 percent between 2004 and 2014. Performance by region varies significantly, with the sharpest declines projected for the Asian and Latin American/Caribbean regions, each at 46 percent. The number of people consuming below the requirement is projected to increase in the Commonwealth of Independent States, but that number relative to total population will remain small. In Sub-Saharan Africa, a 15-percent increase in the number of people with a consumption shortfall is projected.

Countries with the greatest improvements in terms of the projected decline in percentage of undernourished people include India, Colombia, the Dominican Republic, Ecuador, El Salvador, Peru, and Kenya. Because India is the most populous of all the study countries (over 1 billion in 2004), even a small decline in percentage terms translates into a large decline in the number of hungry people. The number of undernourished people in the country is projected to decline from 432 million to 123 million during the next decade. In most cases, the improvements in the countries above are expected to be driven by higher export earnings, which will result in higher food imports. For example, in Colombia and El Salvador, these imports are projected to rise at more than five times the rate of population growth. A similar but less pronounced situation is projected for the Dominican Republic, Ecuador, and Peru.

In contrast to the success stories, there are several countries where the number of hungry people is projected to rise over the next decade. In countries like Afghanistan, North Korea, Nicaragua, Tajikistan, Uzbekistan, Angola, Guinea, and Somalia, deterioration in food security is principally due to stagnant productive capacity. As a result, the rise in the number of undernourished people will mirror the rate of population increase. Of the countries cited above, all but two are experiencing civil strife, further jeopardizing food security. These countries are among the largest recipients of food aid, but food aid is not expected to increase much to alter the projections. The greatest food security challenge these countries face is to restore peace and expand economic activities.

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This finding is drawn from . . .

Food Security Assessment, by Shahla Shapouri, Stacey Rosen, Birgit Meade, Margriet Caswell, David Schimmelpfennig, and Carl Pray, GFA-16, USDA, Economic Research Service, April 2005, available at: www.ers.usda.gov/publications/gfa16/


2004 © WFP/Nancy Palus

How Americans Quench Their Thirsts

Grocery store shelves are filled with nonalcoholic beverages that vary widely in taste, calorie content, and nutritional makeup. Consumers choose which beverages to purchase based on their income and product prices, as well as individual preferences that are shaped by factors like age, education, and race/ethnicity. These choices have important implications for diet and health.

ERS researchers recently used ACNielsen Homescan data to examine how socioeconomic variables affect the mix of beverages purchased. Specifically, the study focused on purchases of milk, isotonics (sports drinks), bottled water, fruit juices and drinks, coffee, tea, carbonated soft drinks, and powdered soft drinks (Kool-Aid type drinks) from retail stores. (Beverages bought in restaurants or other away-from-home eating places were not examined.) Purchases like coffee, tea, and powdered drink mixes were converted into ready-to-drink equivalents to compare quantities. Although the study used 1999 purchase data, food consumption trends change slowly over time—ERS's 2003 food consumption data show similar patterns. Carbonated soft drinks were bought most heavily, followed by coffee, milk, and powdered soft drinks.

Researchers contrasted purchases of higher income households (incomes above 130 percent of the poverty level) with purchases of lower income households (incomes below 130 percent of the poverty level). Lower income households bought more powdered soft drinks (21 gallons per household in 1999 vs. 18 gallons) and tea (16 gallons vs. 15 gallons) and less milk (33 gallons vs. 36 gallons) and fruit juices (11 gallons vs. 14 gallons). The beverages for which the lower income households had higher purchases were cheaper: The Homescan households paid $0.96 per gallon for powdered soft drinks and $1.81 per gallon for tea, while they paid $3.06 per gallon for milk and $4.40 per gallon for fruit juices. The more affordable beverages contained more calories and caffeine and less calcium and vitamin C. Lower income and higher income households bought roughly the same amount of fruit drinks (about 8 gallons) and carbonated soft drinks (about 52 gallons).

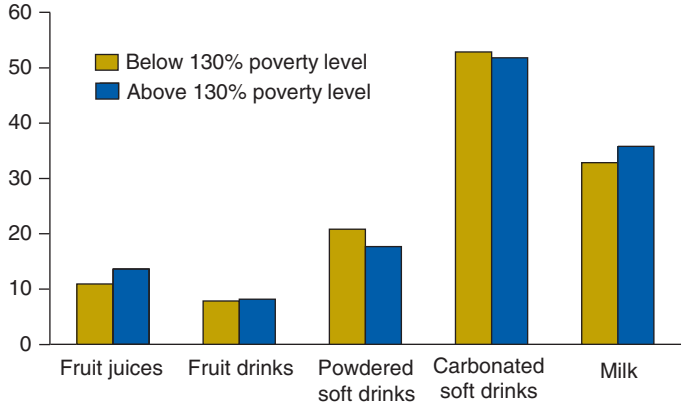
Comstock

Racial differences exist as well, with Black households buying more powdered soft drinks than other racial groups. Also, households headed by a female without a high school degree bought more powdered soft drinks than other households.

Researchers also examined the contribution of nonalcoholic beverages to nutrient intake by calculating per capita amounts of selected nutrients available from beverage purchases. Averaged across households in the survey, at-home beverage purchases provided 10 percent of daily calories (based on a standard of 2,000 calories), about 20 percent of the recommended daily intake of calcium, and close to 70 percent of the recommended daily intake of vitamin C.

Soft drinks are the beverage of choice for Americans

Gallons per household, 1999



Source: Calculated by USDA, Economic Research Service using ACNielsen Homescan data.

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This finding is drawn from. . .

Contributions of Nonalcoholic Beverages to the U.S. Diet, by Oral Capps, Jr., Annette Clauson, Joanne Guthrie, Grant Pittman, and Matthew Stockton, ERR-1, USDA, Economic Research Service, March 2005, available at: www.ers.usda.gov/publications/err1/

Diet Quality Usually Varies by Income Status

A recent ERS study of Americans' diets found that low-income groups tended to have lower quality diets than high-income groups. Not only does a higher income expand food choices, it is also related to factors that tend to improve diet quality, including higher education, better access to well-stocked grocery stores, and greater diet and health knowledge. This result, however, did not hold for children—diet quality among U.S. children did not vary by income.

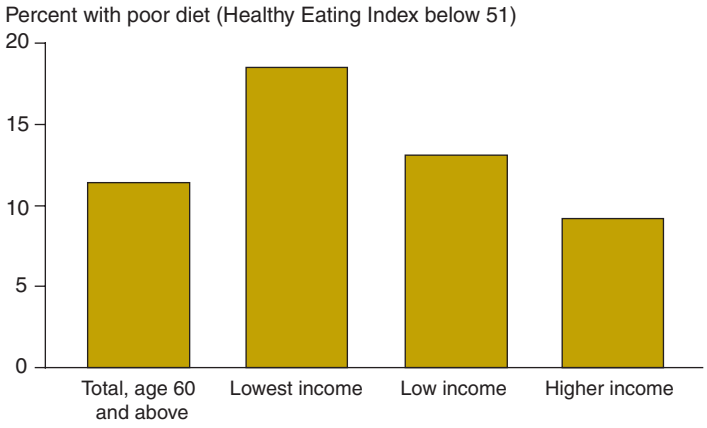
The ERS study is based on the Healthy Eating Index (HEI), as computed by USDA's Center for Nutrition Policy and Promotion using consumption data from the 1988-94 National Health and Nutrition Examination Survey. The HEI, scored from 0 to 100, measures an individual's quality of diet based on 10 components, with higher scores closely conforming to recommendations of the Food Guide Pyramid prior to its 2005 revision.

Twelve percent of Americans age 2 and older had "good" diets (an HEI score above 80), while the rest had diets that were poor in quality or needed improvement. Only 8 percent of people with very low household income (below 131 percent of poverty level) had good diets. Limiting fat and sodium intake and consuming the recommended servings of fruits and vegetables were particularly difficult dietary tasks for the lowest income Americans.

The diet quality of Americans age 60 and older varied the most by income status. Although older Americans' dietary quality was higher on average than that of the general population, their diet quality suffered the most as income fell. Nineteen percent of older Americans with very low household income had poor diet quality (an HEI score below 51), compared with 13 percent of low-income (between 131 and 185 percent of poverty level) older adults, and 9 percent of those with incomes above 185 percent poverty level.

The proportion of children who had poor diets did not vary by income. Overall, 16 percent of school-age children (ages 5-17) had poor diets. A number of factors could contribute to this finding. First, child nutrition programs, such as WIC, free or reduced-price school lunches, and subsidized meals in day care, could reduce variation in diet quality by income. Second, parents and other child-care providers may pay more attention to the dietary recommendations for children under their care than for themselves, and it may be easier to enforce good eating habits for one's children than to adhere to them oneself. Evidence suggests that as children age and make more of their own food choices, they, too, may find it harder to keep good eating habits—only 8 percent of children ages 2-4 had poor diets, versus 16 percent of school-age children.

Older Americans' diet quality varies with income



Source: National Center for Health Statistics, Centers for Disease Control and Prevention, National Health and Nutrition Examination Survey, 1988-94.

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This finding is drawn from . . .

Nutrition and Health Characteristics of Low-Income Populations: Healthy Eating Index, by Biing-Hwan Lin, AIB-796-1, USDA, Economic Research Service, February 2005, available at: www.ers.usda.gov/publications/aib796/aib796-1. A series of related publications is available at: www.ers.usda.gov/publications/aib796/

PhotoDisc

USDA/ARS

Crop Genetic Diversity Boosts Productivity But Faces Threats

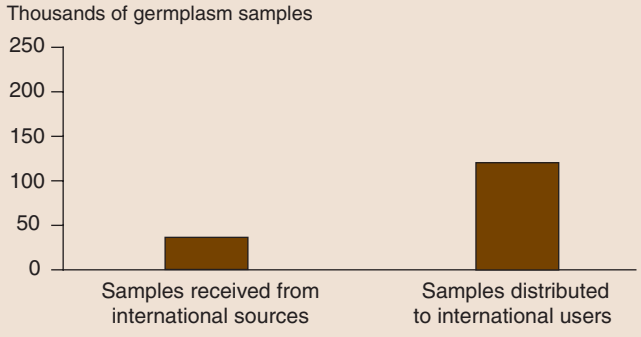
Crop yields have risen steadily over the last century, due in part to sustained research, improvements to seeds, and access to diverse genetic resources. A recent ERS report describes research that estimates a one-time permanent yield increase from genetic improvements for five major U.S. crops that generated an estimated $8.1-billion gain in global economic welfare. Consumers worldwide were the primary beneficiaries.

Crop genetic diversity is threatened by habitat loss, conversion from landraces (farmer-developed varieties) to scientifically bred varieties, and genetic uniformity in scientifically bred varieties. However, fears that loss of diversity will lead to more variability in yields have not yet materialized for major crops. This is partially the result of investments in research and breeders' continued access to genetic resources *ex situ*, in other words, resources collected and stored in genebanks. The U.S. National Plant Germplasm System distributes each year, for free, more germplasm samples than the United States receives from other countries. Nonetheless, a 1997 General Accounting Office study found that *ex situ* conservation efforts in the U.S. may fall short of meeting future crop-breeding needs.

Despite the benefits of maintaining genetic diversity, conservation of diverse genetic resources remains a challenge, in part because genetic resources have the characteristics of a public good: They are openly available and an individual holder cannot easily exclude others from using them, so the private benefits from conservation are small compared to the social benefits. The usefulness of particular genetic resources is highly uncertain, and time horizons for improving genetic resources are long. These characteristics mean that private returns to the holders of crop genetic resources are lower than their values to the world, and are unlikely to provide the incentives to achieve a socially optimal level of crop genetic diversity.

Policies to conserve genetic resources include financial assistance, stronger intellectual property rights, and international agreements. Because many diverse genetic resources lie outside the U.S., the terms of international exchange influence which germplasm is preserved and whether it can be accessed. The International Treaty on Plant Genetic Resources for Food and Agriculture, intended to preserve genetic diversity and promote exchange of germplasm, entered into force in June 2004, but key provisions to implement the treaty have yet to be negotiated.

"Balance of Trade" of the U.S. National Plant Germplasm System for International Exchange, 1990-95



Source: USDA, Economic Research Service and USDA's Agricultural Research Service.

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This finding is drawn from . . .

Crop Genetic Resources: An Economic Appraisal, by Kelly Day Rubenstein, Paul Heisey, Robbin Shoemaker, John Sullivan, and George Frisvold, EIB-2, USDA, Economic Research Service, May 2005, available at: www.ers.usda.gov/publications/eib2

Use of Genetically Engineered Crops Rising Steadily During First Decade

Driven by farmers' expectations of higher yields, savings in management time, and lower pesticide costs, the adoption of first-generation genetically engineered (GE) crop varieties with enhanced input traits has increased rapidly despite consumer resistance in some countries. About 200 million acres of GE crops with traits for herbicide tolerance (HT) and insect resistance (Bt) were grown worldwide in 2004, and U.S. acreage accounts for 59 percent of this amount.

Adoption of GE soybeans, corn, and cotton by U.S. farmers has climbed most years since these varieties became available commercially in 1996. HT crops survive certain potent herbicides, allowing adopters of these varieties to control pervasive weeds more easily. HT soybean adoption has expanded most rapidly and widely, averaging 87 percent of soybean acreage in 2005, followed by HT cotton, at 61 percent of cotton acreage.

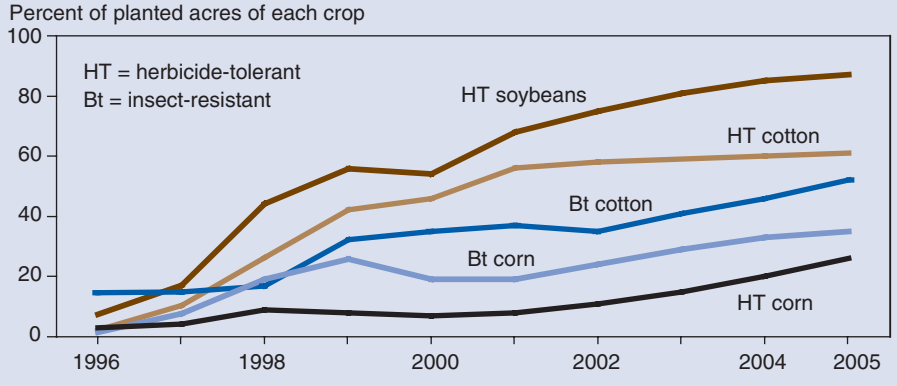
Bt crops contain a gene from the soil bacterium *Bacillus thuringiensis* (Bt) that produces a protein toxic to specific insects. Use of Bt crops is concentrated in areas with high levels of infestations of targeted pests, so acreage shares of Bt corn and cotton are lower than for HT soybeans and cotton, and vary more across States. Bt cotton, which controls tobacco budworm, bollworm, and pink bollworm, was planted on 52 percent of cotton acreage in 2005—ranging from 13 percent in California to 85 percent in Louisiana. Acreage share of Bt corn flattened during 1999-2002 because farmers had already adopted on the acreage where protection against the European corn borer was needed most. Use of Bt corn expanded recently, reaching 35 percent in 2005, following the introduction of a new Bt variety to control the corn rootworm.

ERS research has shown that U.S. farmers are realizing tangible economic benefits from adopting these GE crops through higher yields, lower pesticide costs, and savings in management time. The impacts of GE crops vary with several factors, including pest infestations, seed price premiums, prices of alternative pest control programs, and any premiums paid for segregated crops.

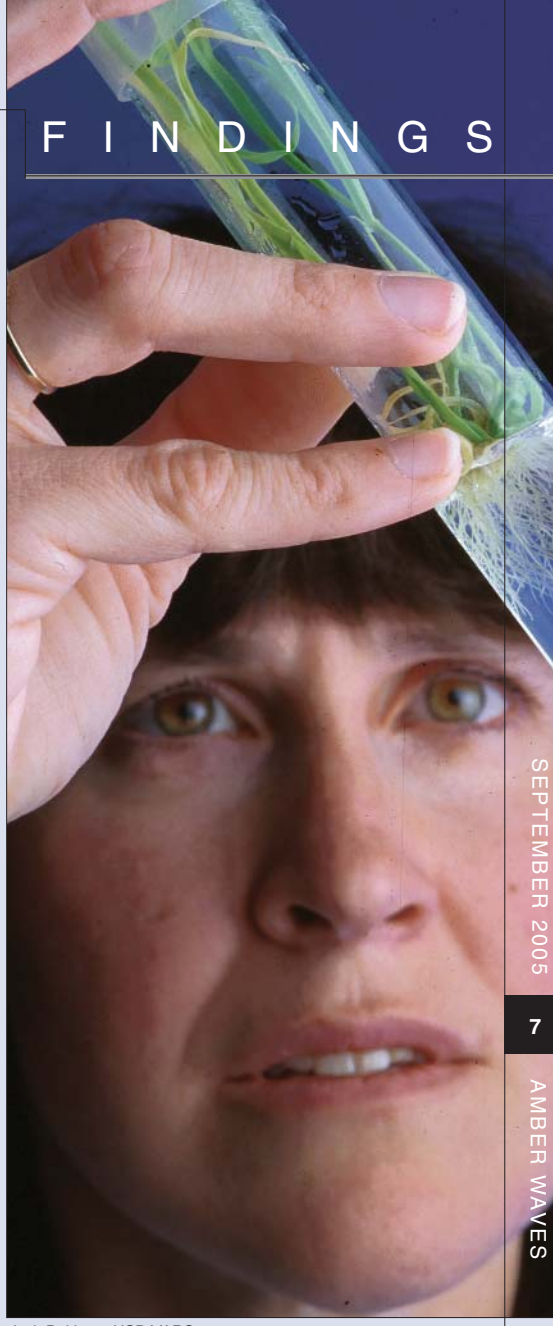
In addition to corn, soybeans, and cotton, U.S. farmers adopted HT canola and virus-resistant papaya and squash. Two GE crops (delayed-ripening tomatoes and Bt potatoes) introduced in the mid-1990s were withdrawn from the market years later due to marketing problems.

Adoption of genetically engineered crops grows steadily in the U.S.

Percent of planted acres of each crop



Data for each crop category include varieties with both HT and Bt (stacked) traits.
Sources: USDA annual surveys.



Jack Dykinga, USDA/ARS

Other biotech crops are in various stages of development. For example, USDA's Animal and Plant Health Inspection Service has approved field testing for crops with resistance to virus, fungi, cold, drought, and salinity; crops that increase protein and oil content and produce naturally decaffeinated coffee; and crops with added vitamins and iron.

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For more information . . .

ERS data on Adoption of Genetically Engineered Crops in the U.S., available at: www.ers.usda.gov/data/biotechcrops/

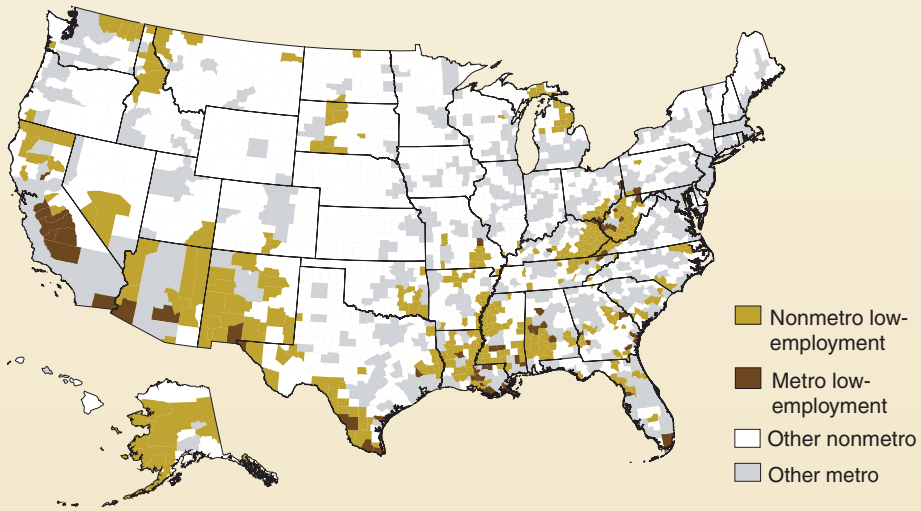
Low Earnings But Steady Job Growth in Low-Employment Counties

The 2000 employment rate of working-age adults was near its historic high due to the robust U.S. economy and continued increases in educational attainment and women's labor force participation. Nearly 3 of 4 U.S. adults ages 21-64 held a job in 2000 (72.8 percent). In 460 counties defined as *low-employment counties,* employment rates were below 65 percent. These counties, mostly nonmetro (rural), have economies with below-average capacity for generating jobs and draw less than the average number of adults into the labor market than other counties. Improved educational and job training opportunities in conjunction with job creation strategies may raise the employment rate in these counties.

ERS's low-employment counties are found primarily in southern Appalachia, the Mississippi Delta, and other Black Belt areas in the South; Indian and Hispanic areas of the Southwest; and timber and agricultural areas of the Northwest. Over half of all low-employment counties also have low educational levels or persistent poverty.

Many low-employment counties have experienced sluggish long-term job growth as technological change and geographic shifts in production have reduced the demand for labor in agriculture, mining, and manufacturing. In a few cases, a sudden loss of jobs due to events such as plant closings has led to high unemployment rates. Overall job growth in low-employment counties has been steady, although slower than the nonmetro average growth.

Low-employment counties are concentrated in the South and Southwest



Note: Low-employment counties had less than 65 percent of residents ages 21-64 employed in 2000.
Source: Calculated by USDA, Economic Research Service using data from the U.S. Census Bureau.

Getty Images

Nonmetro low-employment counties had lower earnings per job in 2000 ($23,623) than all other nonmetro counties ($25,129). Low wages reduce the incentive to enter the labor market, especially among adults in families that require child care. Low-employment counties also have a higher proportion of households headed by single women and a higher share of married-couple families with a single wage earner, usually the husband. Low educational levels further limit opportunities for higher earnings and stable employment. These labor force characteristics are especially associated with lower employment rates among minorities, although rates for non-Hispanic Whites in low-employment counties are also lower than in other nonmetro counties.

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For more information, visit:

The County Typology page of the ERS Briefing Room on Measuring Rurality: www.ers.usda.gov/briefing/rurality/typology/

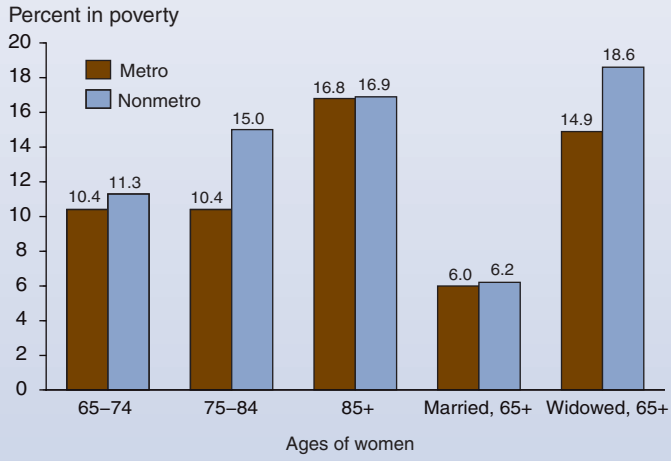
FINDINGS

Older Women and Poverty in Rural Areas

The population in many rural areas is aging steadily as a result of aging-in-place, outmigration of young adults, and inmigration of older persons from metro areas, often straining community resources to provide medical and social services. Rural areas generally have a higher proportion of older persons in their total population than urban areas, and nonmetro poverty rates for older persons are higher than metro rates. Women represent 58 percent of the rural population age 65 and older, and 71 percent of the rural population age 85 and older. Because women outnumber men at older ages and are more likely to be poor, policies affecting rural health and pension programs are key to their financial standing.

Economic status in later life is a cumulative product of earnings, savings and spending, and participation in pension, health insurance, and public assistance plans. Some older women today spent all or most of their working lives in traditional roles, with limited paid work experience. Many who worked in the formal labor market experienced work interruptions due to childbearing and childrearing. Thus, older women may lack adequate financial resources from earnings, savings, or pension plans.

Poverty is higher for older widows than for older married women



Note: Poverty status refers to family income for 2003.
Source: Calculated by USDA, Economic Research Service from the March 2004 Current Population Survey.

Painet Stock Photography

Women constituted 65 percent of the rural poor age 65 and older in 2003. In rural areas, 8 percent of men versus 13 percent of women age 65 and older were poor. Among nonmetro women age 65 and older, poverty rates were three times higher for widows than for married women. Many widowed persons live alone, and women are more likely to be widowed than men. Among the *oldest old* (a term used to define those 85 years and older), 10 percent of men and 17 percent of women in nonmetro areas were poor.

The older population's impact on a rural community will differ widely depending on whether it is composed of relatively young retirees or persons who have remained and grown old in the community. Rural retirement areas may benefit from growth, as inmigrating retirees boost the tax base and help sustain local businesses. On the other hand, rural areas that have lost population, especially younger persons, and experienced declining tax bases may have greater needs for medical services and long-term care for their remaining older population. Rural areas have a higher share than urban areas of the oldest old, who are the most in need of health, medical, and other services that are more limited in rural areas.

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This finding is drawn from . . .

Rural Older Population chapter of the ERS Briefing Room on Rural Population and Migration, www.ers.usda.gov/briefing/population/older/

Alvis Upitis, AgStockUSA

Eyewire

Composite Measure of Economic Well-Being

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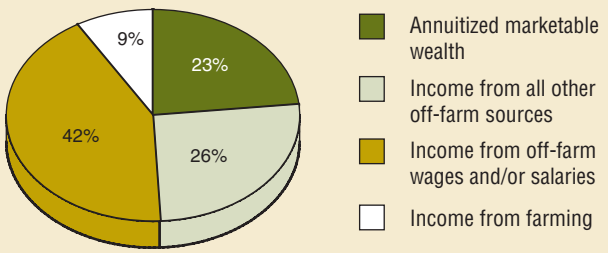
The economic well-being of farm households is a recurring theme in farm policy, but accurate and objective assessment of economic well-being is difficult because income and wealth measures alone provide an incomplete picture of the economic position of the farming unit. Vagaries of weather and the biological risks inherent in agricultural production, for example, contribute to variability in the income of farm households. Similarly, some farm business wealth (e.g., land, machinery, and other capital assets) is not easily converted into forms to support household consumption in times of low incomes.

ERS has recently developed a composite measure of economic well-being (*CWB*) that incorporates household income and an annuity based on the amount of marketable wealth held by the household. While the use of *CWB* is not new to economists or ERS, the richness of data collected through the USDA's Agricultural Resource Management Survey (ARMS) in recent years allows for a more comprehensive and robust measure of economic well-being.

The *CWB* indicator includes all household income and the annualized value of the household's marketable wealth, those household assets that can be easily converted into cash to support household consumption needs. Annuitized marketable wealth excludes the primary income-producing assets of the farm business, like land and machinery.

The composite measure of economic well-being is estimated at $86,386 for the average farm household in 2003. Income from farming comprised $7,383 (9 percent) of the total. In contrast, income from off-farm wages and salaries accounted for $36,433 (42 percent) of the combined totals. Income from all other off-farm sources was $22,384 (26 percent), and marketable wealth at $20,187 (23 percent). These patterns indicate the importance to farm households of policies unrelated to agriculture, such as those that encourage sustained growth in the general economy and higher rates of savings.



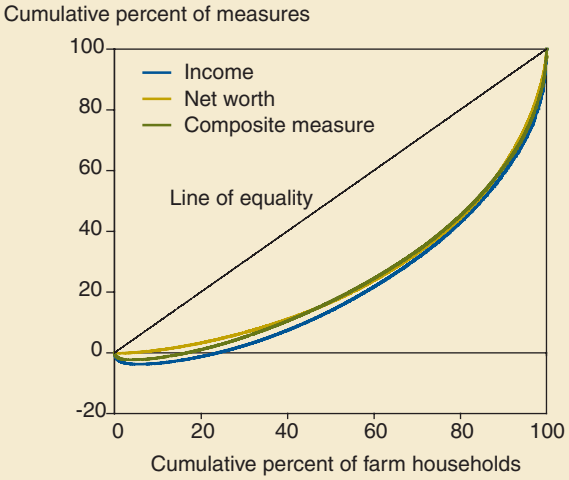
Source: 2003 Agricultural Resource Management Survey.

All charts refer to above legend and source unless otherwise noted.

Eyewire

Adding annuitized wealth to income lessens the degree of inequality among households

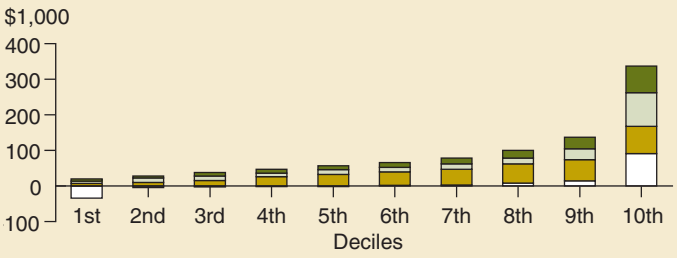
The distributions of income, the composite measure of economic well-being, and of the total net worth (i.e., from farm and nonfarm sources), based on the concept of the *Lorenz* curve, appear to be generally similar for all farm households except for those at the lower ends of the distributions. The distribution of household income is consistently less equal than the distribution of net worth, and the distribution of *CWB* lies between the two. The evidence of greater equality in the distribution of *CWB* compared with income results from farm households with negative or low income tending to have, on average, positive net worth.



The degree of concentration of economic well-being measures is assessed using *Lorenz* curves. The closer the curves are to the diagonal (also known as the equality line), the more equal are the corresponding distributions, and the farther away they are, the higher is the degree of inequality.

Half of all farm businesses did not make a profit from farming in 2003

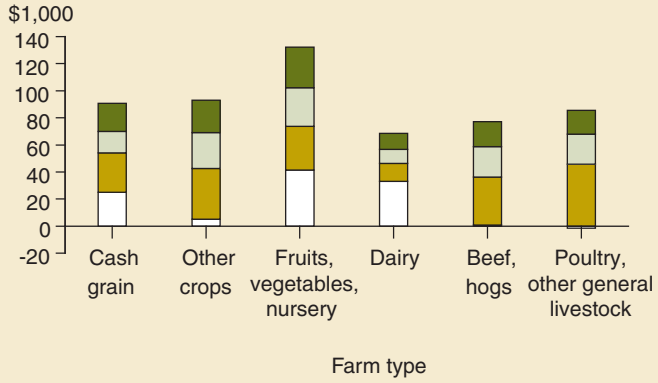
Farm households in the lower half of the *CWB* distribution earned negative incomes from farming. Those in the first decile of the *CWB* distribution report that the combination of income from off-farm sources along with annuitized marketable wealth was not large enough to offset losses from farming in 2003.



'Decile' shares of the CWB measure divide the ordered *CWB* distribution into tenths, or deciles; each decile therefore accounts for 10 percent of the population of farm operator households.

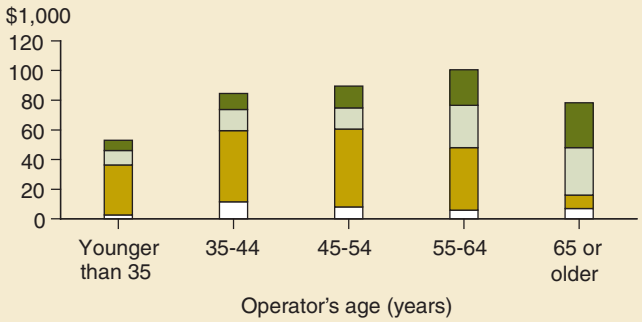
Sources of economic well-being vary by farm specialization

In 2003, economic well-being of farm households was highest for farm households specializing in the production of fruits, vegetables, and nursery products. These farm household types also averaged more income from farming than all other farm types. In contrast, the economic well-being of households with livestock as their specialty (with the exception of dairy producers) was mainly comprised of off-farm income and of annuitized farm and nonfarm wealth.



Farm households' economic well-being reaches its peak as farmers get closer to retirement

The potential income stream from marketable wealth accumulation was an important component of the economic well-being of all farm households in 2003, especially for older farmers. In contrast, income from off-farm wages and salaries comprised the largest portion of the composite measure of well-being for farmers under 65.



This article is drawn from . . .

ERS Briefing Room on Farm Income and Costs, www.ers.usda.gov/briefing/farmincome/

Asia-Pacific Transportation Infrastructure

Linking Food Sources to Urban Centers

William T. Coyle
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William Coyle, USDA/ERS

A century ago, the world's population was largely rural; only 5 percent lived in urban areas. But now, rapid growth in urban areas, particularly in developing countries, is making this the *century of the city*, particularly in the Asia-Pacific region, where half the population lives in urban areas, accounting for barely 2 percent of the land mass. Made up of countries on both sides of the Pacific Ocean — including Australia, Brunei, Canada, Chile, China, Hong Kong-China, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States, and Vietnam— this region's urban areas are expected to grow by more than half a billion people in the next 20 years, almost three times the growth rate of the total population. Three-quarters of the growth will be in the less-developed economies of the region, with much of the growth arising from rural-urban migration. Urban populations are projected to increase by 300 million in China, 75 million in Indonesia, and 25 million in Mexico.

National income is also increasingly concentrated in urban areas, which are home to most of the middle and upper classes and the source of a disproportionate share of the economy's output. Shanghai, for example, accounts for 1 percent of China's population, but generates 12 percent of the nation's gross national product. Higher incomes bring greater per capita food demand and diets richer in meat, fruits, and vegetables than those in rural areas. In urban locales, demand is also greater for food services, convenience, and eating away from home.

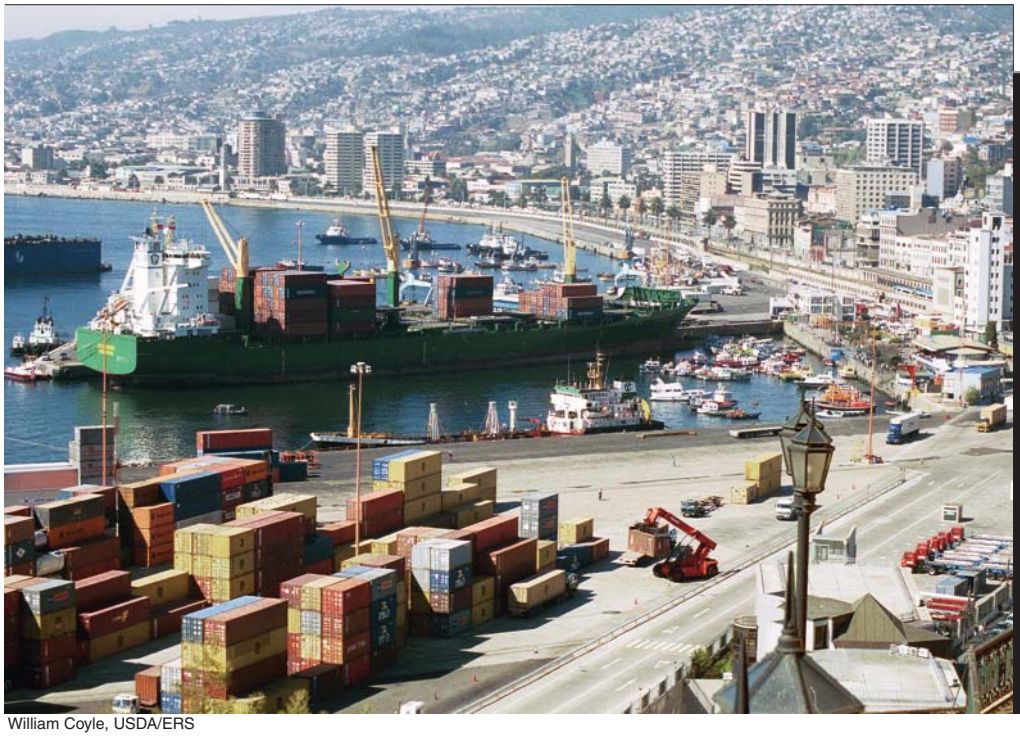
These demand trends will profoundly affect food markets around the region. Transportation infrastructure—roads, railroads, inland waterways, ports, and airports—will play a critical role in supporting the movement of raw agricultural material and food from dispersed producing regions, either domestic or foreign, to urban areas. However, while transportation infrastructure plays an important role in providing affordable food to burgeoning urban areas, other factors—agricultural, regulatory, and trade policies, for example—play a role as well.

Food Demand Concentrated, Food Supply Dispersed

To meet growing urban-based food demand requires a sophisticated food system to store, refrigerate, and deliver food to retail outlets. Well-functioning roads and mass transit systems regularly bring large numbers of people to these outlets. Strong linkages to food-producing regions, both domestic and foreign, assure a steady flow into the city of raw agricultural material, and processed and fresh food. In the developing parts of the Asia-Pacific region, the rapid spread of supermarket chains—characterized by centralized procurement and distribution, a broader geographic range of operations, and fewer but larger volume suppliers—reflects pressure to keep food costs relatively low while coping with the complexity of urban environments. Modern supermarkets account for a growing share of retail food sales and are displacing traditional wet markets and "mom and pop" shops.

While urbanization is leading to more concentrated food demand, agricultural production capacity in the Asia-Pacific region and elsewhere remains widely

Wuhan, China's fourth-largest city, is a key railroad hub and lies on the Yangtze River, the country's longest inland waterway.



William Coyle, USDA/ERS

Valparaiso is Chile's second largest port and closely linked to the country's capital, Santiago, 120 kilometers (70 miles) to the southeast.

dispersed. With the exception of mountainous and arid regions, food production is located throughout North America, in pockets along the western coast of South America, throughout much of Southeast Asia, along the eastern and southern coastal areas of Australia, and in the eastern half of China. Nearly every state, province, and prefecture of the region produces some food, yet many food-producing areas struggle to be economically viable. Large areas of Southeast Asia and Southern China, for example, have good soils but suffer from lack of adequate infrastructure to profitably access markets and yield-enhancing inputs, including seeds, fertilizer, and pesticides.

Coastal Urban Areas Accessible to Foreign Suppliers

Many rapidly growing urban areas across the developing parts of the Asia-Pacific region are concentrated along coastlines. These cities, by modernizing their port facilities, can take advantage of the low costs of ocean transport and thus facilitate linkages with foreign food suppliers. They can also benefit domestic producers who want to export.

The Asia-Pacific region has the world's three busiest container ports—Hong Kong (China), Singapore, and Shanghai.

Jakarta, Manila, Shanghai, Shenzhen, and Bangkok are among the largest, most rapidly growing coastal urban areas in the Asia-Pacific region. Beyond these major cities, populations lean toward living in smaller cities and towns close to the major cities where the infrastructure tends to be better developed. About 60 percent of China's population lives in the 12 coastal provinces. More than half of Indonesia's population lives on 10 percent of the land area—the narrow island of Java—where many of the country's largest coastal cities, including Jakarta, are located.

Many developing economies invest first in modernizing port facilities and airports in or near large coastal urban areas, thus facilitating global trade, including trade in food and agricultural products. Part of this modernization may include privatizing government-owned entities, with private interests both providing scarce financial support for these expensive facilities and introducing market principles. Private-sector involvement creates incentives to conform to international standards of trade and adopt fast-changing shipping technology. Private interests have played an important role in port development in Malaysia, the Philippines, Mexico, Korea, Thailand, and Vietnam.

The extent of port modernization can be measured by growth in container throughput or such productivity indicators as "moves per crane per hour." A shipping container is a standardized box, typically either 20 feet long, 8 feet high, and 8.5 feet wide (a 20-foot-equivalent unit TEU) or 40 feet long, 8 feet high, and 8.5 feet wide (2 TEUs). Containerized shipping is commonly used for perishable and other processed food products but is even making inroads with bulk commodities, like grains and oilseeds.

The Asia-Pacific region has the world's three busiest container ports—Hong Kong (China), Singapore, and Shanghai. In 2003, the region's overall container throughput grew 13.5 percent. Shanghai's growth was the most spectacu-

lar, expanding from half a million TEUs in 1990, when the port ranked 40th in the world, to 11.3 million in 2003, when it became the world's third-busiest port. China's top 10 ports grew 24 percent between 2002 and 2003; Ningbo (near Shanghai) and Chiwan (1 of 3 Shenzhen ports near Hong Kong), both grew more than 40 percent. Ports in Korea and Malaysia are also growing rapidly.

While customs regulations and other barriers might slow down port clearance in the less developed parts of the region, the port facilities themselves are approaching "best practices" and are equal in "moves per crane per hour" to ports in the more developed economies. Shanghai averaged 28 moves per crane per hour in 2003, Manila International Container Terminal averaged 32, and Malaysia's Tanjung Pelapas, 32, comparing well with

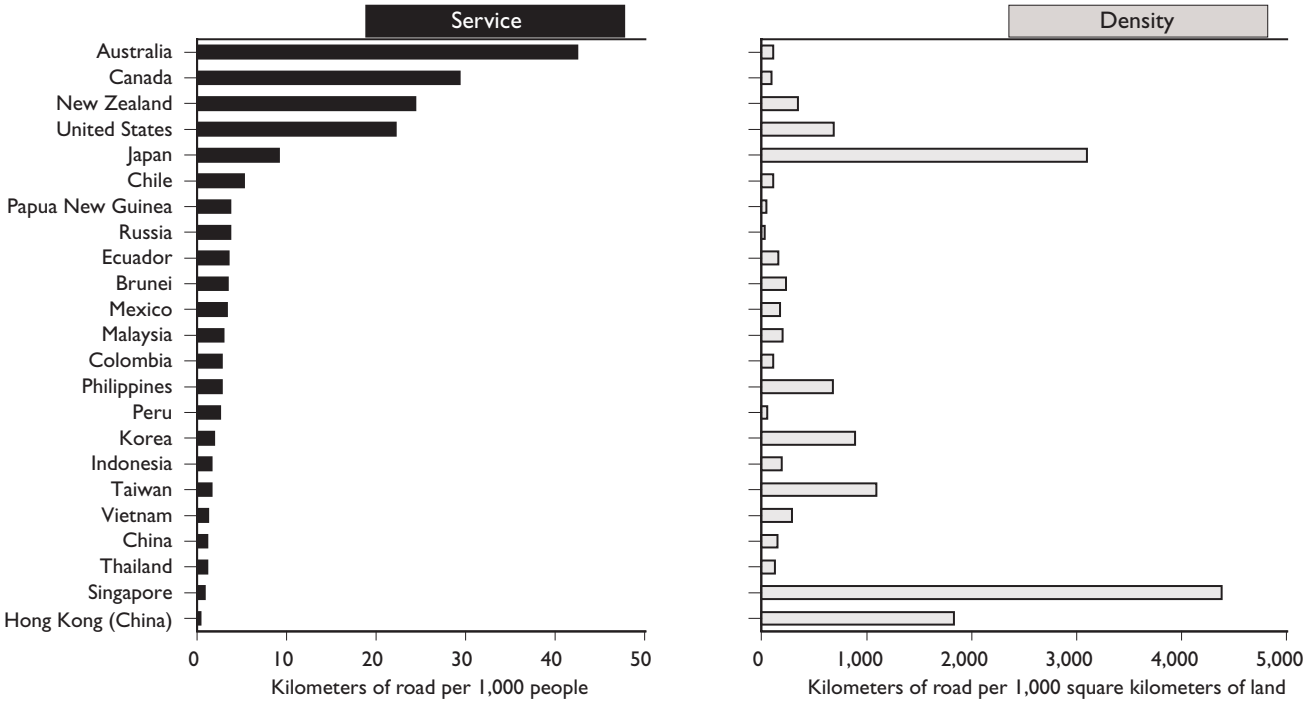
A rubber-tired gantry moves and stacks containers at northern Vietnam's new deepwater container port at Cai Lan in Quang Ninh province.

Sydney at 27, Southern California ports at 25-26, and Rotterdam at 30.

The low cost of ocean shipping, the cheapest of all transportation modes over long distances, enhances linkages between urban port cities and foreign suppliers. Containerized shipping also conforms well with the standards and product volumes that modern cost-conscious supermarkets prefer. Thus, in some instances, foreign suppliers may be more competitive in these coastal markets than are domestic producers.

The ability of domestic producers to penetrate urban, coastal markets and compete with foreign suppliers depends on the quality and extent of roads, railroads, and other infrastructure that connect these markets with food-producing areas in the country. In the Asia-Pacific region, the quality and extent of road and rail systems vary greatly. As measured by length

Road service and density in the Asia-Pacific region



Source: Pacific Food System Outlook and World Bank.

William Coyle, USDA/ERS

Hong Kong, the busiest container port in the world, is now challenged by ports in Singapore, Shanghai, and nearby Shenzhen.

of road or rail per square kilometer, transportation infrastructure is generally more developed in the higher income, densely populated economies of East Asia: South Korea, Taiwan, and Japan. In terms of length of road or rail per capita, infrastructure is more developed in Australia, Canada, New Zealand, and the United States. By both measures, the less developed economies in China, Southeast Asia, and Latin America significantly underinvest in road and rail infrastructure.

This underinvestment results in higher domestic shipping costs and slower delivery times. For example, the overland shipping cost of a container from Chongqing in central China to Shanghai is more than double the maritime transport cost from Los Angeles to Shanghai, even though the distance is about one-seventh as great.

In Southeast Asia, the fragmented geography of Indonesia and the Philippines and poorly developed infrastructure increase shipping times and the possibility of spoilage. Fruit delivery by truck from Manila to Davao on the southern island of Mindanao requires two ferry crossings and 3 days to cover 850 kilometers (510 miles). (See box, "Examples of Infrastructure Development in the Asia-Pacific Region.")

Transportation Infrastructure Affects the Economy

The transportation infrastructure within a country facilitates competition in food products and services, which promotes more efficient resource allocation and lower food costs. Thus, maintaining, upgrading, and expanding the infrastructure plays an important role in supporting economic growth. For farmers, new or upgraded infrastructure has a similar effect as the removal of a general tax. It can lower transaction costs for marketing products and purchasing inputs, reduce the likelihood of post-harvest losses by increasing the quantity and quality of transport services, and ultimately bring higher returns for the producer and lower food costs for the consumer.

A simple example illustrates these dynamic food system impacts. With construction of a dirt road and a few bridges to connect a poor isolated rural area with a main highway, farmers can reach markets more quickly even using traditional transportation modes, such as foot, bicycle, or animal-drawn cart. Eventually, farmers can take advantage of motorized vehicles to bring in production inputs and deliver harvested produce to local markets more quickly, in larger volumes, and with less spoilage. Rural households gain better access to health care and schools, contributing to higher labor productivity on the farm. When the road is paved, costs decline even further, as marketing times diminish and weather is less of an obstruction to travel.

While transportation infrastructure is needed to lower food costs to urban consumers by connecting surplus food-producing areas with cities, it may not be suf-

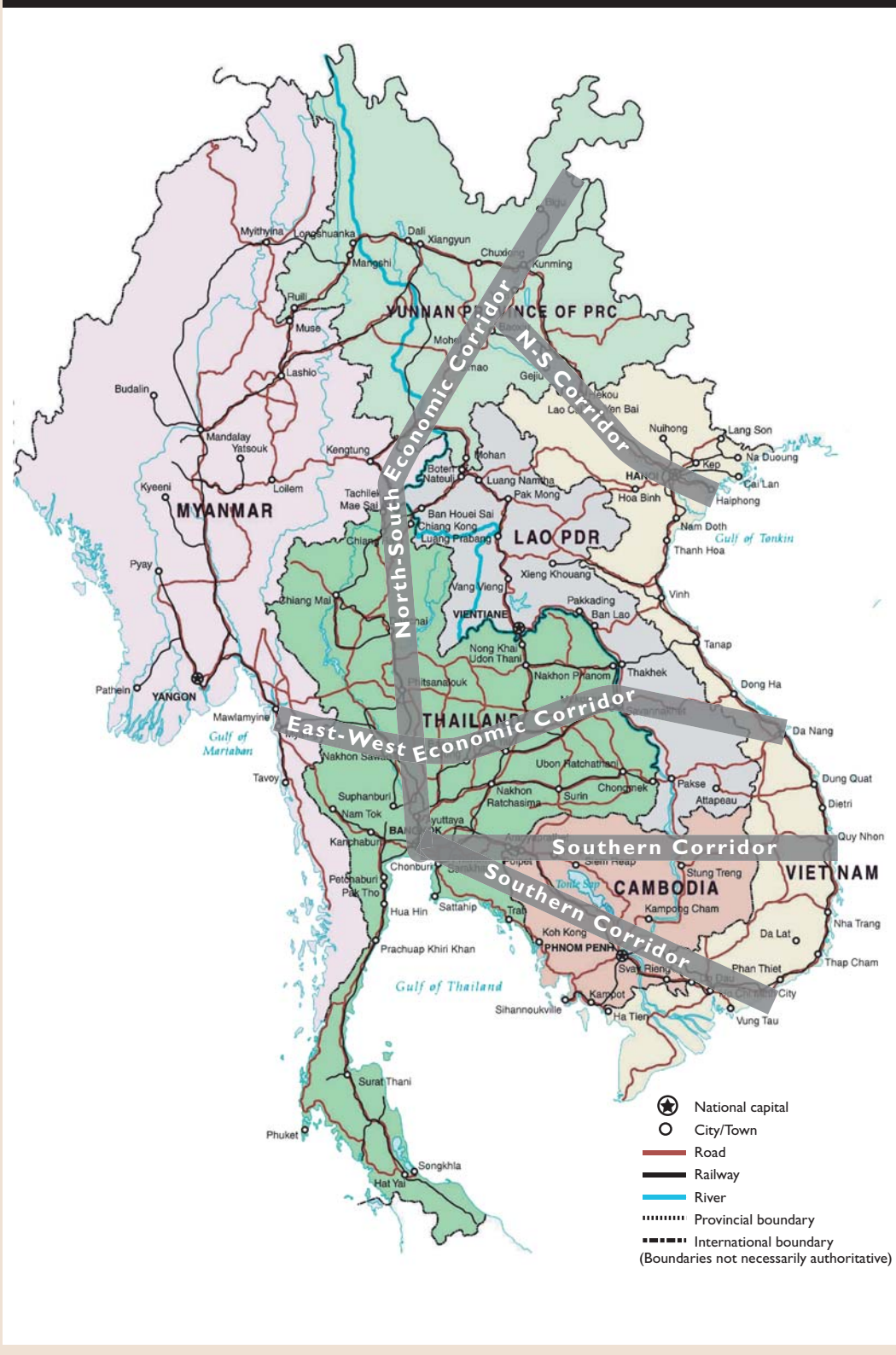
Examples of Infrastructure Development in the Asia-Pacific Region

Infrastructure development is best examined on a case-by-case basis because it plays a central but varied role in different parts of the region. Three examples illustrate how the development of transportation infrastructure is improving the connections between agricultural areas and consumers in the Asia-Pacific region, creating a more seamless food system.

China is making a major effort to connect interior provinces with populous coastal areas. This effort includes a $42-billion program to add 10 percent to China's rail system by 2006 and extensively developing and enhancing inter-Provincial road systems. As a result of the construction of the Three Gorges Dam, navigability of the Yangtze River now extends over 1,000 miles from Shanghai to Chongqing. This, along with other infrastructural development, is making the Yangtze River basin, a potential rival to the Guangzhou-Pearl River delta area adjacent to Hong Kong in southern China, currently one of the most important manufacturing centers in the country. Collectively, these developments are making food delivery to urban areas faster and cheaper, raising returns to farmers, and lowering consumer costs. They are also making domestic products (e.g., citrus, semitropical fruit, and certain vegetables) more export competitive.

The North American Free Trade Agreement (NAFTA), which includes the U.S., Mexico, and Canada, has focused on developing infrastructure in the north-south corridors to better integrate Mexico, which is less developed than the other two members. Infrastructure development in Mexico has been rapid, with road systems expanding 30 percent during 1990-2000. Privatizing Mexico's rail system in the late 1990s and forming joint ventures with other North American rail companies has improved service and raised the share of freight transported by rail.

Greater Mekong subregion's road development



Border constraints, protectionist policies, and concerns about illegal immigration and sanitary and phytosanitary issues continue to hamper intra-NAFTA trade. A reciprocal U.S.-Mexico truck agreement still has not been implemented, and cabotage policies constrain the freedom of truck and marine shipping by allowing only domestic companies to transport goods within a country. These constraints, however, are offset by advances in information technology, pre-border clearance, and expanding intermodal systems (involving more than one form of transportation service—rail, truck, marine, or air—during a single journey). Improving roads and rail systems are reducing the cost of transporting U.S. grain to Mexico's industrial heartland (the area outlined by Mexico City, Monterrey, and Guadalajara) and Mexican horticultural products to U.S. and Canadian markets.

A major project in the **Greater Mekong subregion** is underway to better integrate five Asian countries (Vietnam, Laos, Cambodia, Thailand, and Myanmar) and China (Mekong River watershed). The project, supported by national governments and the Asia Development Bank, is designed to, among other objectives, link remote agricultural areas with urban centers and ports. Three major road or economic corridors are being developed: one between southern China and Bangkok, Thailand, and southern China and Hanoi; a second between Myanmar and Da Nang, Vietnam; and a third between Bangkok, Thailand, and Ho Chi Minh City and other parts of Vietnam. Customs procedures are being streamlined to reduce time spent at border checkpoints. The project potentially will benefit 70 million people living in the Mekong basin, many of whom are subsistence farmers. Travel times and transport costs have declined, and food produced in remote rural areas can now more easily reach major urban markets and, through ports, export markets.

ficient. For example, a country's agricultural, regulatory, or trade policies can negate the benefits from new or upgraded infrastructure. Sometimes investments are made in infrastructure to alleviate bottlenecks, when the real problem lies in regulatory policies that support certain economic interests. For example, traffic congestion at the U.S.-Mexico border results from policies requiring reciprocal truck access and inspection, not lack of adequate transportation infrastructure. Tariffs and other import restrictions affect the flow of food products from domestic and foreign sources. Other laws and regulations, such as cabotage, which requires national flag vessels to provide domestic intercoastal service, affect the cost of transportation services. Governments also impose duties on transportation through licenses, tolls, and fuel taxes that ultimately get passed on to agricultural producers and consumers.

Investment Is Key, but Not Sufficient

Keeping food costs low for growing urban populations poses a major challenge in this century of the city. A key component is investment in streamlining domestic supply chains, including expensive transportation infrastructure to connect urban centers with food-producing areas; in facilitating food imports through trade-liberalizing measures; or in some combination of approaches.

Most infrastructure is a public good. Once the initial investment is made, many interests can use the good, often without payment. The potential for free riders means that market forces alone tend to result in underinvesting in infrastructure. Hence, governments are crucial in encouraging and funding infrastructure investments.

The largest share of financial support comes from local and national governments and private investors. International financial institutions (Asia Development Bank, World Bank, Inter American Development Bank) have played modest roles, about $5 billion per year in loans of the estimated $100 billion needed for new investment and maintenance of rail and road infrastructure in developing countries, according to the World Bank. And bond markets need to be further developed to allow governments to tap into the high savings rates of Asia-Pacific economies for funding expensive long-term infrastructural projects.

Investing in transportation infrastructure alone cannot create an efficient food supply system. An efficient supply system also requires appropriate economic incentives, competitive transportation and logistic services, and policy reforms. Discussions about agricultural market reform across the region, which tend to focus more narrowly on commodity and farm policies, must be expanded to include these broader issues.

This article is drawn from. . .

"Where Will Demographics Take the Asia-Pacific Food System?" by William Coyle, Brad Gilmour, and Walter J. Armbruster, in *Amber Waves*, Volume 2, Issue 3, USDA, Economic Research Service, June 2004, available at: www.ers.usda.gov/amberwaves/june04/features/wherewilldemographics.htm

The Role of Transportation Infrastructure in a Seamless Food System, based on contributions of 14 Pacific Rim countries and jointly sponsored by the Economic Research Service, the Pacific Economic Cooperation Council, Farm Foundation, Agriculture and Agri-Food Canada, the Transport Institute of the University of Manitoba, and the Vietnam Chamber of Commerce and Industry, November 2004, available at: www.pecc.org/food/

Farm Poverty Lowest in U.S. History

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Poverty on America's farms has been an economic reality for most of the country's history. Fifty years ago, half of all farm families were poor. The images of impoverished farmers living through the Dust Bowl of the 1930s remain fixed in the minds of Americans. The New Deal, which was the genesis of many USDA programs, addressed the Nation's concerns for this vulnerable population, which, back then, relied largely on farming for its livelihood. Thus, safety net programs that linked payments to commodity production were a logical means of reducing farm poverty at that time.

Today, however, farm poverty is at its lowest level in the Nation's history, thanks to the availability of remunerative off-farm employment coupled with onfarm gains in labor productivity. The well-being of farm families, who are fewer in number than in the 1930s, has improved significantly and depends much less on the outcome of the farm business.

Jack Delano, USDA

Russ Munn, AgStockUSA

Still, some farmers remain poor—exactly how many depends on how poverty is defined. One estimate puts the least well-off farm households at 14 percent of the 2.1 million American farm households, while another categorizes 5 percent of farm households as having low incomes and low wealth. But, because modern farm households derive their income from many nonfarm sources, traditional farm programs are not as relevant to farm households' well-being as they were in the 1930s. Instead, general safety net programs, such as food stamps or Medicaid, may be the more appropriate policy prescription, though farm household participation in such programs is typically lower than that of the general population. Closer examination of the statistical and demographic dimensions of farm poverty points to the questions that must be answered in order to devise a 21st-century approach to helping poorer farmers.

Who Is Poor?

Characterizing the well-being of households through the use of economic statistics is complicated and often controversial. The Federal definition of who is poor has remained essentially unchanged since the 1960s, except for adjustments for inflation, and is subject to many criticisms about its ability to portray accurately the numbers and characteristics of Americans with low incomes. Eligibility criteria for Federal assistance programs for those with low incomes vary with respect to income thresholds and asset limits, implying multiple views of the level of deprivation that merits Federal intervention. Similarly, no one statistical measure can capture all dimensions of a farm household's financial well-being. Three concepts can be used to categorize low-income farm households: the Census Bureau's poverty line, USDA's definition of limited-resource farmers, and ERS's definition of low-income/low-wealth farmers.

No single statistical measure can capture all dimensions of a farm household's financial well-being.

The Census Bureau's poverty definition is meant to represent income sufficient for a family to meet basic needs for food, shelter, clothing, and other essential goods and services. A household is defined as poor with respect to its income in the previous year. In 2003, 11 percent of all U.S. households had incomes below the poverty line. When applied to farm households, however, the Census Bureau's definition may produce misleading results because farm business revenue is highly volatile. Even the largest of farms may sustain losses in one year that pull down household income significantly. Still, revenue may rebound the next year, and family living standards would have been maintained in the interim by borrowing against or liquidating assets.

Three concepts provide different perspectives on farm poverty

Concept *Source*	**Definition, 2003**	**Farm poverty, 2003** (total 2.1 million farm households)
Poverty line *Census Bureau*	Annual household income less than $18,660 for a family of four (two adults, two children)	14 percent 289,000 farm households
Limited-resource farmer *USDA*	◆ Direct or indirect gross farm sales not more than $106,400 in each of the previous 2 years, and ◆ Total household income at or below the Census Bureau national poverty line for a family of four or less than 50 percent of county median household income in each of the 2 previous years	11 percent 230,000 farm households
Low-income/low-wealth farmer *ERS*	Annual income and wealth below median levels for U.S. households, about $44,000 and $90,000, respectively	5 percent 103,000 farm households

Note: Definitions applied to farm and household data from USDA' s 2003 Agricultural Resource Management Survey.

Source: USDA, Economic Research Service.

The Census Bureau's definition does not reference assets or net worth, which is, in any case, very low for poor nonfarm households. In general, farm households have higher asset holdings than nonfarm households because of the value of the farmland they own. The Census Bureau's definition of poverty does not vary by region or (any longer) by farm versus nonfarm household, although it does vary by family composition and, for one- and two-person households, by whether someone in the household is over age 65.

Under USDA's definition, limited-resource farmers may report farming, a nonfarm occupation, or retirement as their major occupation, but their households share the characteristics of low incomes and relatively small sales of agricultural products. The requirement for 2 sequential years of low household income helps address the volatility of farm business earnings. The definition does not specify any limit on the value of assets. Limited-resource farms are distributed broadly throughout the United States.

The ERS categorization of farm households as low-income/low-wealth recognizes that the exclusion of assets in characterizing the well-being of farm households is problematic. For farm households, land and other assets represent wealth that may be tapped to maintain living standards (albeit not indefinitely). Average farm household wealth, or net worth, in 2003 was $664,000. By comparison, the median net worth for all U.S. households was $90,000 in 2003, according to the Federal Reserve. Because of the transitory effects of farm revenue volatility, farm households that experience low incomes in 1 year still often have significant wealth.

Accounting for asset holdings can present a more complete picture of the resources available to a household in making ends meet. On average, low-income/low-wealth households had annual incomes in 2003 of about $18,000 and net worth of $31,000. (See "Composite Measure of Economic Well-Being" on page 10 for another interpretation of farm household well-being.)

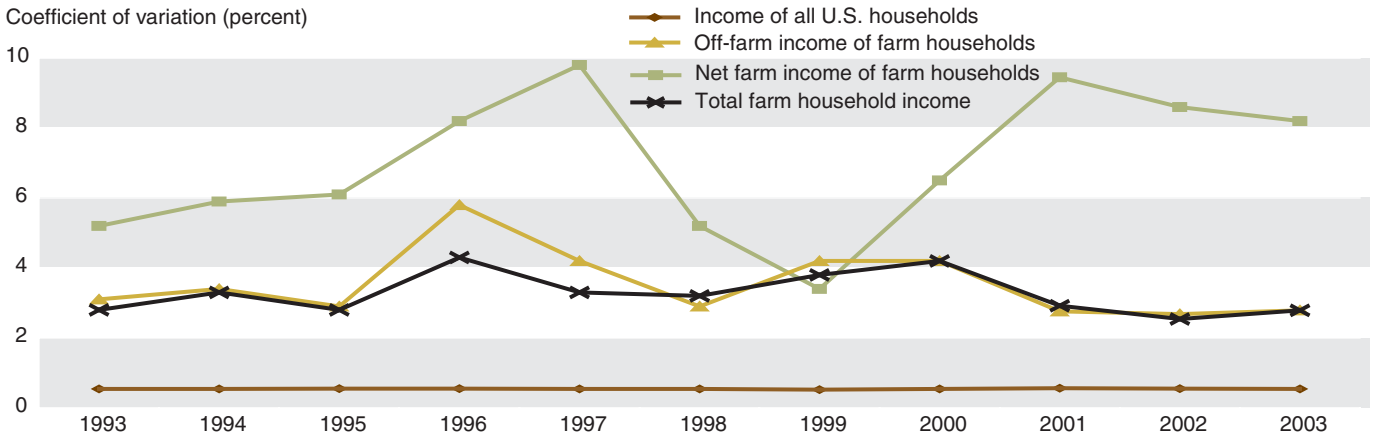
The level of household income aside, the contribution of farm earnings to poor families' incomes is modest, as it is for farm households generally. Off-farm sources account for 90 percent of aggregate farm household income. For many poor farmers, farm income is negative. As an example, in 2003, almost 60 percent of all limited-resource households with positive household income had a loss from farming.

Demographics Vary by Poverty Definition

Farm households in the Census Bureau poverty, limited-resource, and low-income/low-wealth categories are thus seen to be, to varying degrees, less well-off financially than their neighbors. However, the demographic characteristics of these households vary somewhat with the definition of poverty used.

Age Farm households living in poverty as defined by the Census Bureau include those who operate larger farms and have substantial wealth but whose income has temporarily fallen to a low level. Consequently, the age profile of these households looks quite a bit like that for all U.S. farms, with about half of all household heads (the farm operators) between the ages of 35 and 54. Moving to the limited-resource households, with the requirement for small sales and 2 years of low income, gives a picture of an older group, with 55 percent over age 65 (versus about a quarter of all farm operators).

Income of farm operator households is more variable than income of all U.S. households



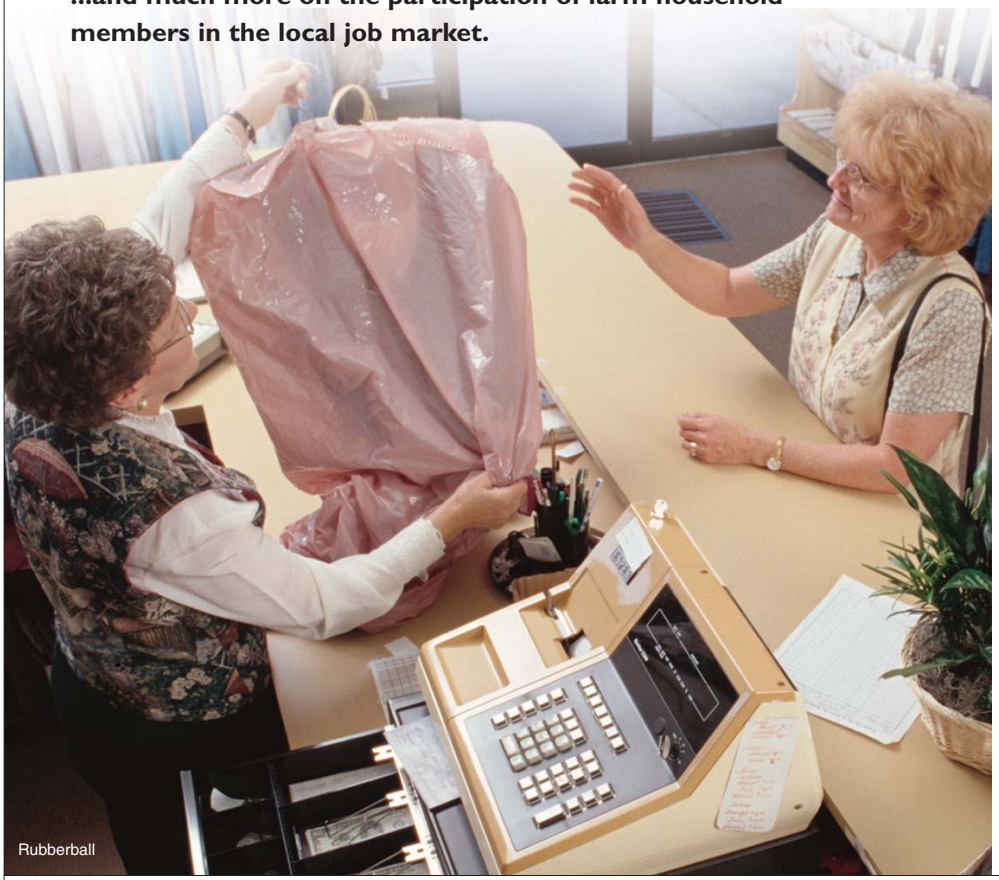
Note: Coefficient of variation is defined as the ratio of standard deviation of income to the mean of income.

Source: USDA, Economic Research Service, 1993-2003 Agricultural Resource Management Survey; U.S. Census Bureau, Current Population Survey for all U.S. households.


Arthur Rothstein, USDA

The financial well-being of farm families has improved significantly and depends much less on the outcome of the farm business...

...and much more on the participation of farm household members in the local job market.

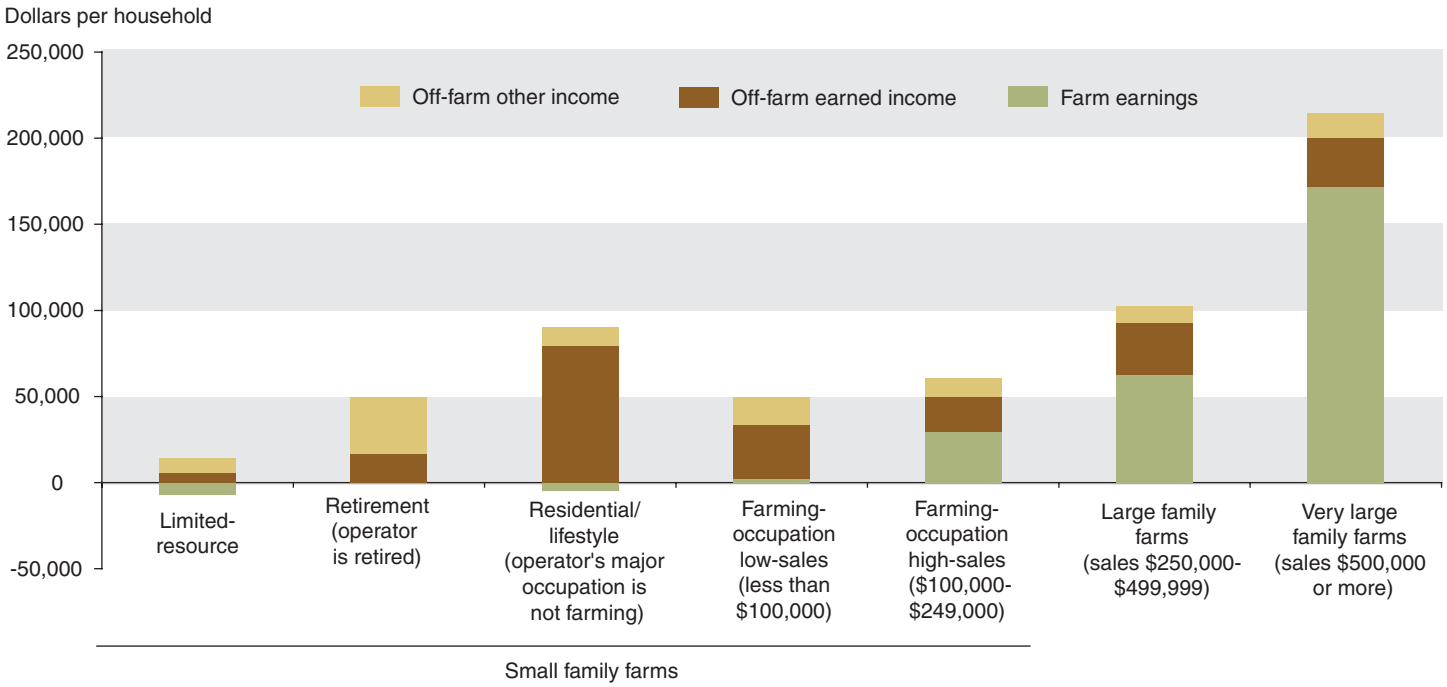

Rubberball

Adding the asset limits that are part of the low-income/low-wealth definition yields a much younger set of farm operators, almost half of whom are younger than 35. This is perhaps to be expected, as older households have accumulated assets over the course of their lives, and these assets can be drawn upon to generate living expenses. Younger families have fewer assets to draw on to buffer income swings.

Education Limited-resource and low-income/low-wealth farm operators are less likely to have education beyond the high school level compared with either the larger group of farm operators with incomes below the Census Bureau poverty line or all farm operators. Eighty percent of limited-resource farmers and 70 percent of low-income/low-wealth farmers have high school educations or less. For all farm operators, the portion is 55 percent (and 66 percent for farm operators in households below the official poverty line).

Race/Ethnicity More than 85 percent of the least well-off farm households are White. This result is consistent with the fact that in 2003, 91.4 percent of all farm households were White. However, minorities are disproportionately represented among some of the poorer groups. For households with incomes below the Census Bureau poverty line in 2003, 11.3 percent were minorities (who comprise 8 percent of all farm households). For limited-resource households, the portion is 6.3 percent and for low-income/low-wealth households, 16 percent. While minorities are somewhat overrepresented among lower income farmers (under two of the three measures), the difference is not nearly as stark as it is for the general population. There, the poverty rate for non-Hispanic Whites in 2003 was 8.2 percent, while for Blacks and Hispanics, the figures were 24.3 percent and 22.5 percent.

Off-farm income is important to farm households



Note: Earned income comes from off-farm self-employment or wage or salary jobs. Other income includes interest, dividends, benefits from Social Security and other public programs, and other forms of income. See text for definition of limited-resource farms. Farm earnings for retirement farms not included because of reliability concerns.

Source: USDA, Economic Research Service, 2003 Agricultural Resource Management Survey.

Geographic location Poorer farm households are slightly more likely than average farm households to live in either persistent-poverty counties or farming-dependent counties. Persistent-poverty counties are the 386 counties in which 20 percent or more of the population was poor over the past 30 years. These counties are found mainly in the Southeast, Appalachia, and the Southwest. Eight percent of all farm households live in these counties. In comparison, 13.7 percent of all low-income/low-wealth farm households live in these counties.

Farming-dependent counties are found mainly in the Northern Great Plains and Prairie Gateway regions. In these counties, either an annual average of 15 percent or more of total county earnings were derived from farming during 1998-2000 or 15 percent or more of employed residents were working in farm occupations in 2000. Just under 10 percent of all farm households live in farming-dependent counties, compared with 11.8 percent of all low-income/low-wealth households. The picture that emerges then is one of farm poverty spread throughout the country, without marked geographic concentration.

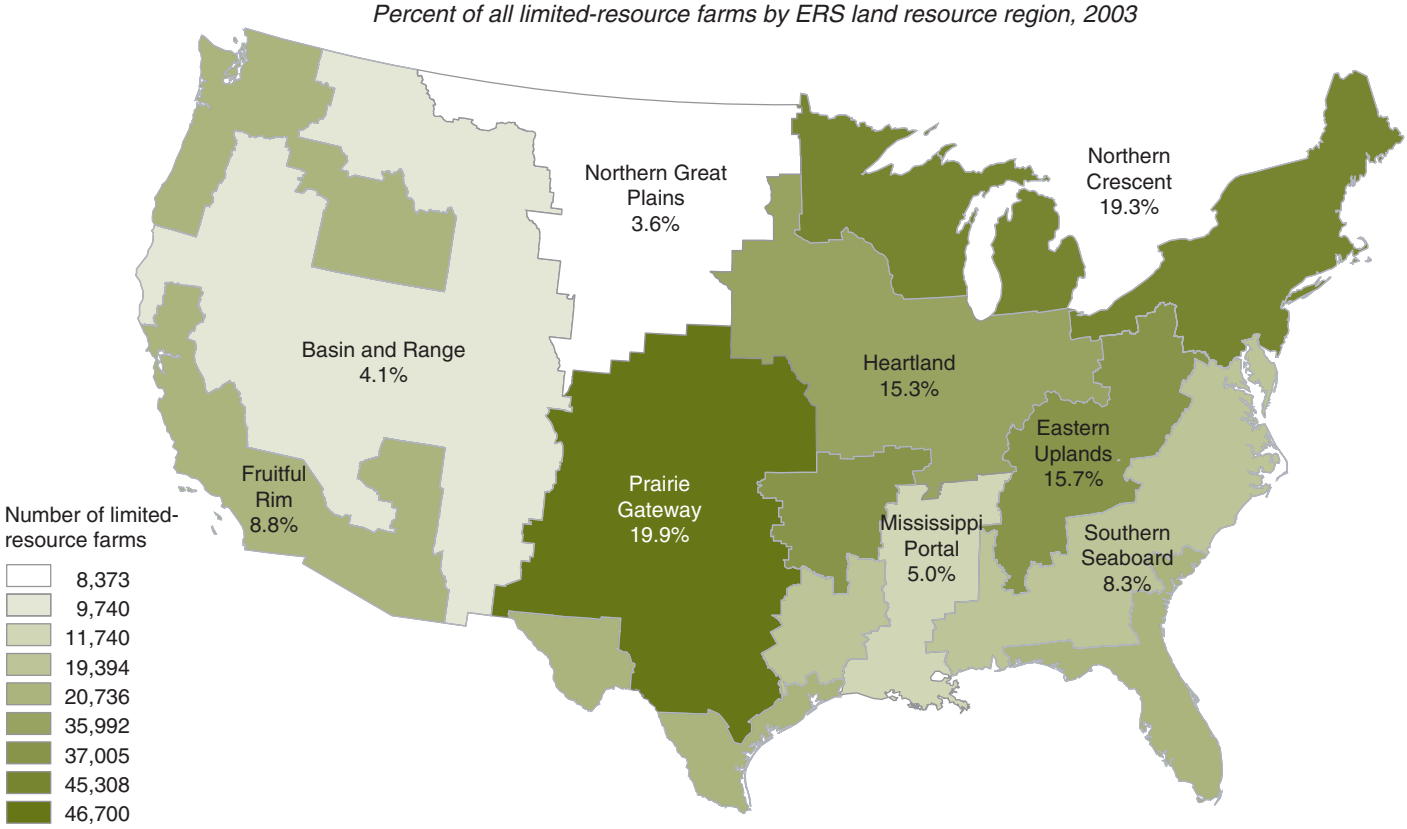
General Safety Nets May Be the Answer

Though the farm poor do participate in today's commodity programs, the payments they receive are typically not sufficient to keep them out of poverty. In 2003, for example, 29 percent of limited-resource farms participated, garnering an average of $5,000 annually per participating farm, or 19 percent of their gross cash farm income. Much larger payments go to higher volume farms. For example, two-thirds of very large farms (sales of at least $500,000) received $71,000 per participating farm in 2003, or 7 percent of their gross cash farm income. So while the relative importance of farm payments to the poor is higher, the absolute amount is low. At any rate, the farm safety net provides no guarantee that these households surmount poverty.

The Federal policies that are important to the least well-off farmers, then, are those of the general safety net for poor people, not the farm safety net. Here the discussion focuses on the Food Stamp Program. To be eligible, a household must have income of no more than 130 percent of a poverty line derived from the Census Bureau definition. Liquid assets, such as a bank account, cannot exceed $2,000 for most households. Other assets, such as a home, are not considered in determining food stamp eligibility. Similarly, for farm households, farm-related assets—such as farmland, farm

The geographic distribution of limited-resource farms mirrors that of all U.S. farms

Percent of all limited-resource farms by ERS land resource region, 2003



Source: USDA, Economic Research Service, 2003 Agricultural Resource Management Survey.

houses and buildings, farm equipment, and livestock—are not considered.

For food stamps (and most other assistance programs), a person must apply to receive benefits. A large proportion of eligible U.S. households choose not to apply. Why? Some may choose not to participate because of the embarrassment they believe they would feel using food stamps. For others, benefit levels are not high enough to induce signing up; families with incomes near the eligibility threshold receive proportionally smaller amounts of food stamps than those with lower incomes. Participation in the workforce may constrain the time a person has to sign up for food stamps; workers may be unwilling to take time off to apply. And potential food stamp recipients may have additional "income" generated through informal activities, say through barter. For farmers, factors not shared by most of the general population—namely, the ability to grow food and a possibly greater stigma attached to receiving food stamps due to this ability—may influence their decision to participate.

In recent research using the Current Population Survey (CPS), ERS and Iowa State University analysts compared participation of eligible farm households in the Food Stamp Program with that of eligible nonfarm households. While eligible nonfarm households participated in the program at rates approaching 50 percent over the period 1988-2003, rates for poor farm households were roughly half that, at about 20 percent. What might account for this difference?

Compared with nonfarm households, farm households are more likely to have characteristics generally associated with nonparticipation. In particular, they are more likely to own their own homes, to be married, and to be White. In addition to demographic differences, eligible farm households also have higher incomes than do eligible nonfarm households. In the CPS data, average farm household income was about 20-30 percent higher than that of nonfarm households, although it was still below 130 percent of the poverty line. Households with higher incomes receive lower food stamp benefits, thereby eroding the incentive to participate.

The employment status of eligible households is another determinant of food stamp participation. While three-quarters of both farm and nonfarm households have wage and salary income, farm households are as much as five times more likely to have income from self-employment. This combination of self-employment and job-holding on the part of poor farm operators

Farm and nonfarm households eligible for safety net programs have different characteristics

Characteristics	Eligible farm households	Eligible nonfarm households
	Percent	
Own homes	64	29
Married	81	43
White	76	41

Source: ERS analysis of 1989-2004 Current Population Survey data.

may restrict the amount of time that can be allocated to applying for Federal assistance.

But what if farmers and nonfarmers had identical characteristics, would farmers still have lower participation rates? In other words, is there something unique about being a farmer in terms of food stamp participation? Statistical analysis shows that even if farmers and nonfarmers had the same incomes and shared demographic characteristics, farmers would still have food stamp participation rates as much as 40 percent lower than their nonfarm counterparts. Why this might be so is a subject for future research.

So, poor farmers are not participating in these general safety net programs and are not receiving farm-specific safety net payments in the same magnitude or proportions as their better off peers. Yet, the importance of farm safety net programs to some families suggests that the programs' absence would lead to changes in the number of farm households eligible for food stamps. Ending farm safety net programs could result in as much as a 5-percent increase in the number of farm households eligible for food stamps. Such an outcome would only strengthen the need to understand the determinants of farmers' participation in food stamps.

Beyond general assistance programs, improvements in the financial well-being of poor farm families depends, as it does for the nonfarm rural poor, on the availability of employment in rural areas. The distinctive characteristics of rural labor markets, including earnings that average 20 percent below those of urban areas, limited employment opportunities, and a relatively strong reliance on extractive industry and manufacturing jobs, present unique challenges.

Contemporary Farmers, Contemporary Solutions

In the 1930s, the rejuvenation of the farm sector could have reasonably been expected to boost rural economies and the well-being of farm families. More than three-fourths of all rural counties depended on agriculture as their primary source of income. There were 30.4 million people living and working on 6.3 million farms. The rural farm population represented over half the rural population, which itself was a quarter of the U.S. total.

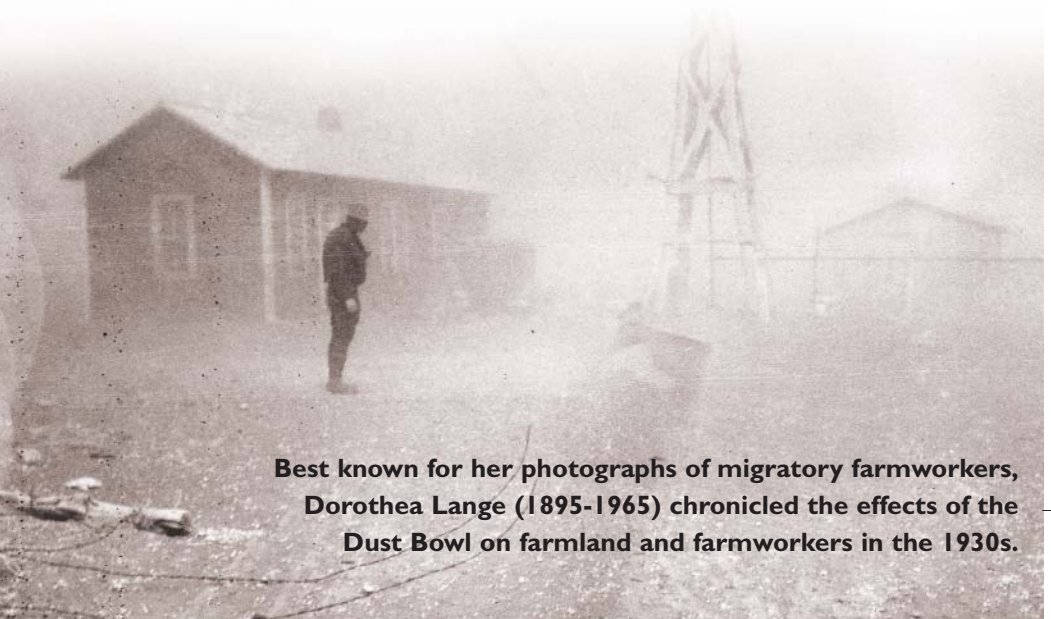
At the turn of the 21st century, 5.9 million people lived or worked on 2.1 million farms, representing 2 percent of total U.S. population. Only 20 percent of rural U.S. counties now depend on agriculture for more than 15 percent of earnings. Even in these farming counties, nonfarm sectors have been and continue to be major sources of employment. Compared with the circumstances of the Depression, contemporary farm policy is less significant for the rural sector, particularly for low-income farm households. Further progress in eradicating the effects of poverty on farm households depends on increasing farmers' use of the general social safety net as well as economic development and the generation of off-farm job opportunities.

This article is drawn from . . .

Structural and Financial Characteristics of U.S. Farms: 2004 Family Farm Report, edited by David E. Banker and James M. MacDonald, AIB-797, USDA, Economic Research Service, March 2005, available at: www.ers.usda.gov/publications/aib797/

"Farm Poverty and Safety Nets," by Craig Gundersen and Susan E. Offutt, *American Journal of Agricultural Economics*, November 2005.

A Safety Net for Farm Households, by Craig Gundersen, Mitchell Morehart, Leslie Whitener, Linda Ghelfi, James Johnson, Kathleen Kassel, Betsey Kuhn, Ashok Mishra, Susan Offutt, and Laura Tiehen, AER-788, USDA, Economic Research Service, October 2000, available at: www.ers.usda.gov/publications/aer788/



Best known for her photographs of migratory farmworkers, Dorothea Lange (1895-1965) chronicled the effects of the Dust Bowl on farmland and farmworkers in the 1930s.

PhotoSpin

Rural Areas Benefit From Recreation and Tourism Development

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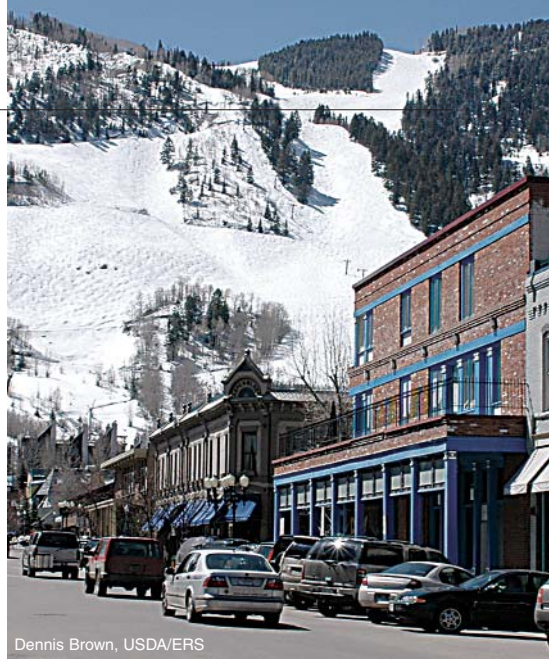
Beautiful scenery—lakes, mountains, forests—attracts people to rural resort areas in the United States. Rural recreation areas have grown rapidly in recent years, and recreation and tourism development has become a popular vehicle for rural economic development. Recreation development involves more than just tourist-related businesses, such as hotels and restaurants; it encompasses all economic growth that results from people moving into the community to take advantage of its recreational amenities. This kind of development has the potential to dramatically transform a stagnant rural community into a thriving community by attracting retirees, entrepreneurs, and young workers, diversifying the economy, and improving the quality of life with a broader array of goods and services.


Dennis Brown, USDA/ERS

But recreation development comes with potential problems. Some problems are growth-related—such as congested roads, crowded schools, environmental strains, housing shortages, despoiled scenic views, and conflicts over land use and public policies. Other problems are specific to the tourism industry's workers (unskilled or foreign), many of whom earn relatively little and have few fringe benefits. And another downside: Criminals may be particularly attracted to some recreation areas.

Is recreation and tourism development a viable economic option for rural areas? ERS examined some key questions about the socioeconomic effects of rural recreation development. The answers are generally favorable, with improved employment conditions, earnings, and incomes; lower poverty rates; and healthier and better educated populations. However, conditions vary by type of recreation area, and higher housing costs and crime rates can accompany the more favorable outcomes. (See box, "Definitions and Methodology.")

More Work, Higher Earnings

Because of rapid employment growth in rural recreation areas and a potentially broader array of jobs, including more seasonal and part-time positions that appeal to residents unable to work full-time, year-round jobs, employment options would likely be enhanced by recreation development. However, it may not be easier for residents to find jobs due to competition with other workers who have recently moved to the area.

ERS researchers found that recreation development, measured by the extent to which a county's employment, income, and housing depend on recreation and tourism, is linked to a higher percentage of the working-age population having jobs. This percentage-employed measure encompasses discouraged workers who had dropped out of the labor force, making it a more comprehensive and meaningful measure of employment conditions. Moreover, recreation development led to an increase in this employment measure during the 1990s for all age groups, except the population ages 65 and older.

Jobs that are usually associated with recreation development, such as those in hotels and restaurants, are assumed to be low paying with few fringe benefits. Some related service jobs, such as those in retail businesses, may also pay low wages. However, low-wage workers in recreation areas may have access to more opportunities to work part-time and seasonal jobs to supplement their incomes, and some service and construction jobs associated with recreation development pay quite well.

Recreation development appears to have increased the growth in earnings per job during the 1990s. But average earnings per job in 2000 were not significantly higher in rural recreation areas. To better measure what residents earn from employment, ERS looked at total earnings

Definitions and Methodology

The word "recreation" is used in this article to refer to the leisure activities of tourists as well as seasonal and permanent residents. However, when discussing recreation's estimated impact on various socioeconomic indicators, the term "recreation development" usually refers to the extent to which a county depends on recreation development for employment, income, and housing.

ERS used the 2002 version of its *recreation county typology* developed by Ken Johnson and Calvin Beale to analyze rural recreation areas nationwide. The number of recreation counties studied was 311, including 11 types varying by geographic location, natural amenities, and form of recreation.

ERS examined selected indicators of socioeconomic well-being in rural recreation areas nationwide, using county-level data from the 2000 Census and other Federal data sources. First, socioeconomic conditions and trends in rural recreation counties were compared with those in other nonmetro counties (excluding metro areas). Socioeconomic conditions and trends were also compared across various types of rural recreation counties. Next, multiple regression analysis was conducted to estimate the impact of recreation-dependency on socioeconomic conditions and trends in the 311 rural recreation counties.

For more details, see *Recreation, Tourism, and Rural Well-Being,* by Richard Reeder and Dennis Brown, ERR-7, USDA, Economic Research Service, August 2005, available at: www.ers.usda.gov/publications/err7/

Wild River Adventures

Dennis Brown, USDA/ERS

per resident worker, which includes earnings from second jobs (part-time and seasonal). Second jobs are expected to be more readily available in recreation counties than elsewhere. Total earnings per resident were substantially higher ($2,000 more per worker) in recreation counties than in other rural counties. Contrary to conventional wisdom, recreation development seems to have increased residents' earnings.

Cost of Living Higher, Better Education and Health

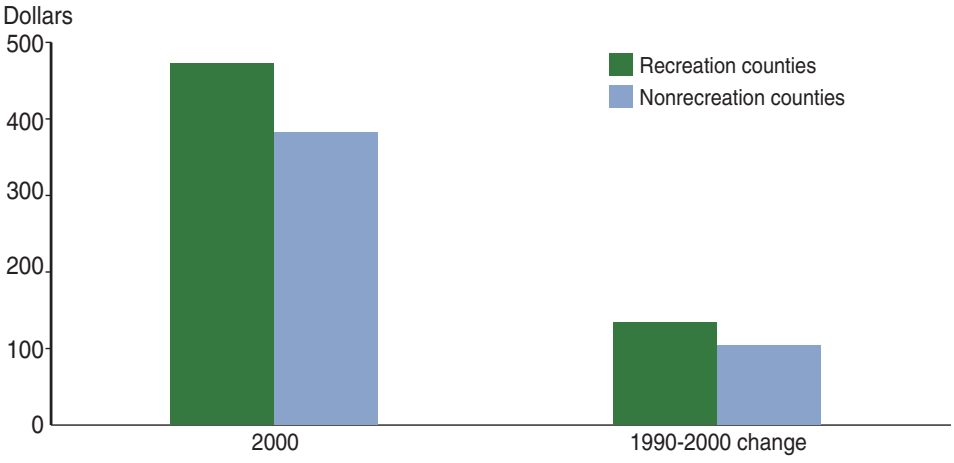
Anecdotal evidence suggests that housing costs have risen rapidly in some of the most well-known recreation areas, becoming so high that many workers can no longer afford to live in the area, sometimes requiring long commutes. In addition, higher housing costs may prevent the children and grandchildren of some long-term residents from finding housing in their home towns. While this may be true in some recreation areas, it is not known how widespread this higher cost of living is.

However, median rent for housing (an important component in cost of living) in recreation counties is 23 percent higher than in other nonmetropolitan (nonmetro) counties, reducing some of the economic advantages for recreation county residents, but only partially. Median household incomes are $3,185 higher in recreation counties than in other counties, while median annual rent is only $1,080 higher in recreation counties. This implies that the higher rent offsets about a third of the recreation county income advantage.

Recreational development might attract migrants who tend to have higher levels of education than nonmigrants. As expected, ERS research found that recreational development leads to a more educated population, particularly when education is measured by the share of adults with college degrees.

Recreation development is also associated with good health (measured by age-adjusted death rates), as might be expected from the higher number of physicians (per 100,000 residents) in recreation counties than in other rural counties. The availability of physicians, however, was not responsible for the good health of residents. Other factors, such as greater opportunities for physical exercise, may explain the health advantages associated with recreation development. In addition, the pristine environments of many recreation counties, with clean air and water, might lead to better overall health.

Recreation counties had significantly higher monthly rents and more growth in rents in the 1990s



Source: Calculated by ERS using data from the U.S. Census Bureau.

DigitalVision

More Crime, Other Social Problems

When recreation development is unplanned or occurs too rapidly, it can lead to congested roads and can strain the capacity of public services. Recreation areas have significantly higher rates of population growth than other rural areas, suggesting that some growth-related social problems, such as school crowding, housing shortages, pollution, and loss of identification with the community, may be present. ERS researchers examined road congestion by looking at commute times and found that recreation development was not linked to the commute time to work in 2000. If anything, recreation development appears to have helped keep down commute times in recent years because recreation counties had smaller increases in average commute times during the 1990s than other rural counties.

Recreation development can also result in higher poverty rates if significant numbers of low-wage, low-skilled workers arrive to work in tourist-related service establishments. However, ERS research indicates that recreation development results in significantly lower levels of poverty in rural recreation areas. In addition, recreation and tourism development appears to have contributed to declines in local poverty rates during the 1990s.

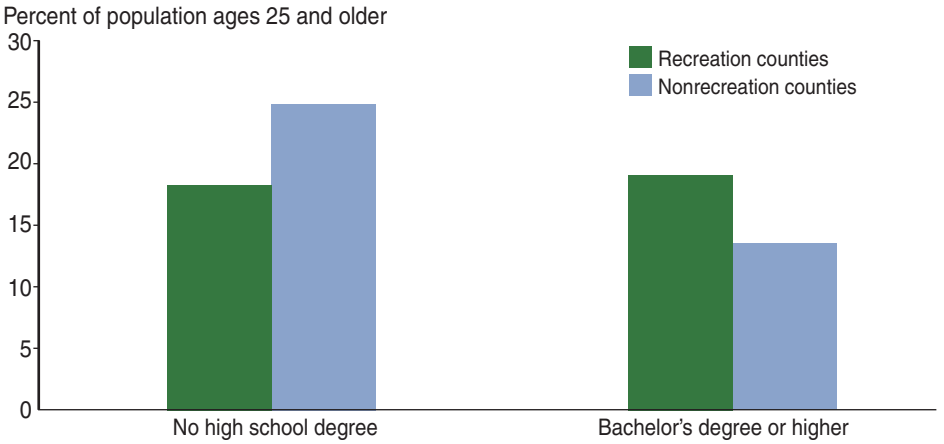
Another possible disadvantage is higher crime rates: Criminals may be drawn to recreation communities to prey on tourists, or certain types of recreation, such as casino gambling, could attract illicit activity. Crime rates (for serious crimes) are higher in recreation counties than in other rural counties. However, the way crime rates are calculated may be biased inherently against recreation areas. Crimes against tourists and seasonal residents are counted in the crime statistics, but tourists and seasonal residents are not counted as part of the population base upon which the crime rates are calculated. Thus, even if people in recreation areas do not have a higher chance of becoming victims of crimes, the crime rates for these areas will appear higher than elsewhere because of this bias. Nevertheless, one could still argue that recreation-related crime adds to the local cost of policing and incarcerating criminals, just like recreation-related traffic adds to the cost of maintaining roads.

Conditions Vary From Place to Place

The benefits of recreation development for rural areas appear to be generally positive. This finding, along with the finding that socioeconomic effects vary significantly from one place to another, will inform policymakers seeking to achieve meaningful development through this strategy.

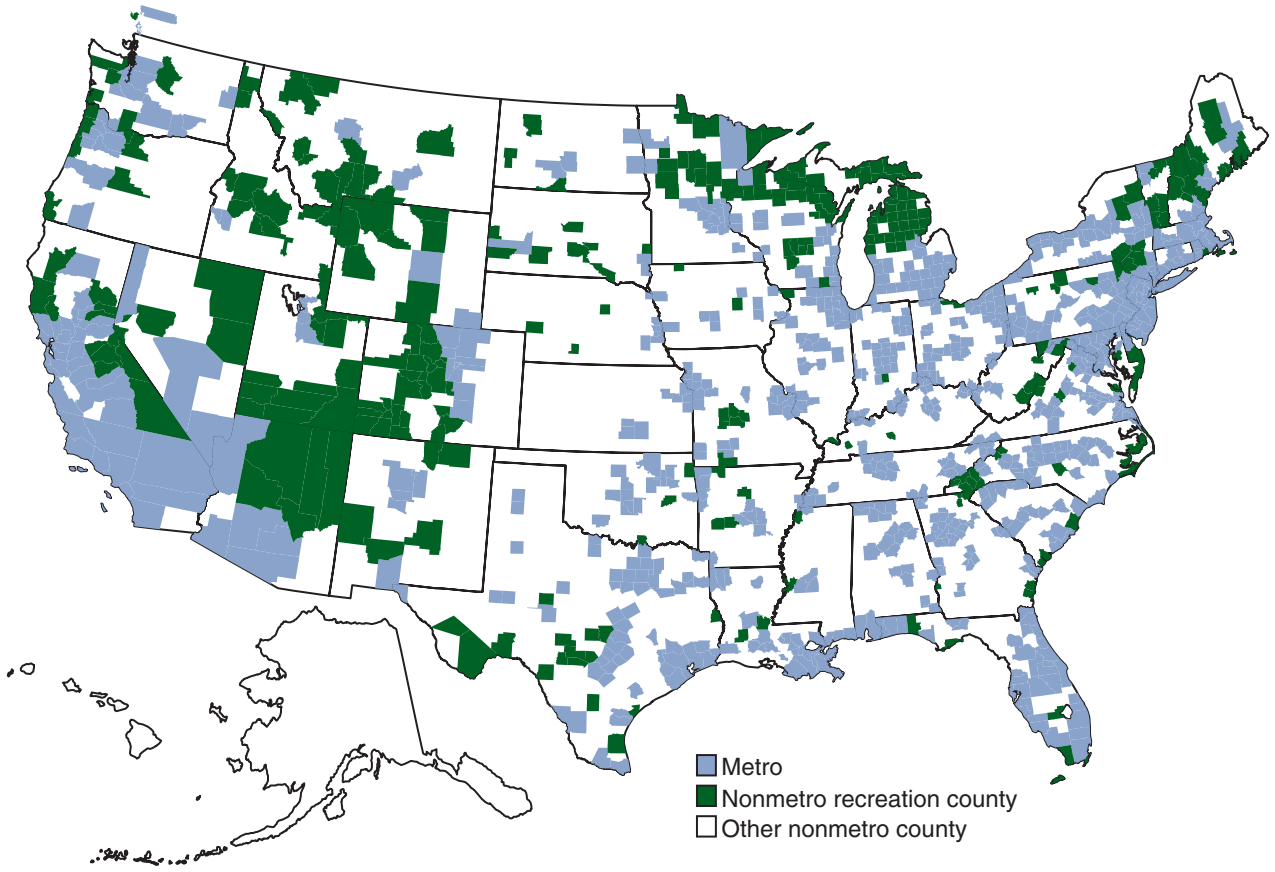
The rural recreation counties in this analysis exhibit a considerable degree of diversity in socioeconomic conditions. For example, counties with ski resorts have among the wealthiest, best educated, and healthiest populations among all recreation county types. These counties also have relatively high crime rates. In contrast, counties with reservoir-based recreation facilities (mainly located in parts of the Great Plains and the Midwest) and recreation counties in the southern Appalachian region have among the poor-

Residents are better educated in recreation counties, 2002



Source: Calculated by ERS using data from the U.S. Census Bureau.

Nonmetropolitan recreation counties are concentrated in the West, Upper Midwest, and Northeast, 2002



Note: Excludes counties in Alaska and Hawaii.
Source: Adapted from Calvin L. Beale and Kenneth M. Johnson, 2002, "Nonmetro Recreation Counties: Their Identification and Rapid Growth," *Rural America,* Vol. 17, No. 4.

est, least educated residents among all recreation county types and relatively high age-adjusted death rates, but they have relatively low crime rates. Counties with casino facilities had among the highest rates of job growth and large increases in earnings per job during the 1990s. Casino counties also had among the highest rates of growth in the share of employed people ages 65 and older, perhaps reflecting the greater need for jobs among older people in these high-poverty communities. Because recreation county types are not evenly distributed across the country, some of the differences may reflect interregional diversity.

This analysis focused on counties that have already succeeded in developing recreation as a significant industry. Most of these places have amenities that attract people. In contrast, some places that employ recreation as a development strategy may encounter difficulties because they lack natural amenities or other attributes that can attract large numbers of people. In these less attractive places, the socioeconomic benefits of recreation development are likely to be smaller.

This article is drawn from . . .

Recreation, Tourism, and Rural Well-Being, by Richard Reeder and Dennis Brown, ERR-7, USDA, Economic Research Service, August, 2005, available at: www.ers.usda.gov/publications/err7/

"Nonmetro Recreation Counties: Their Identification and Rapid Growth," by Kenneth M. Johnson and Calvin L. Beale, *Rural America*, Vol. 17, No. 4, 2002, pp. 12-19, available at: www.ers.usda.gov/publications/ruralamerica/ra174/

ERS Briefing Room on Infrastructure and Rural Development Policy, at: www.ers.usda.gov/briefing/infrastructure/

Bruce Forster, Getty Images

Improving Air and Water Quality Can Be Two Sides of the Same Coin

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Rural areas have long been idealized as the place to go for good, clean air. However, the "fresh" air of the countryside may not be so fresh after all. Since farmers began tilling the soil to grow crops and raise animals, agricultural production practices have generated a variety of substances that enter the atmosphere and have the potential of creating health and environmental problems. The relationship between agriculture and air quality first entered the public psyche in the 1930s with the severe dust storms of the Dust Bowl. Although huge dust storms are long gone, and air emissions in most rural areas are not high enough to cause concern, the air in some farming communities can now be as impaired by pollutants such as ozone and particulates as air in urban areas.

Air quality policies have traditionally focused on urban areas and industrial emissions. Extending these laws to cover agriculture would require an understanding of how farmers respond to different policy incentives. Farmers have many choices in deciding on what to produce and the production practices to use. Their production decisions are based on market prices, the characteristics of the farm's resources, the technologies that are available, and the farmer's particular level of management skill. But incentives to consider wider impacts of their production choices on environmental quality are often lacking. Environmental policy can influence a farmer's decisions by changing the costs of inputs to encourage or discourage input use, or by mandating that particular management practices be used or abandoned. Currently, a lack of knowledge about air emissions from agriculture could hinder the development of cost-effective policies.

Policy formation is also compounded by the fact that possible efforts to reduce agricultural air emissions could diminish the effectiveness of ongoing efforts to address water quality concerns. At a minimum, regulations and incentives designed to address a problem in one medium (air or water) may not be as cost effective at meeting resource quality goals as those that are coordinated across multiple media.

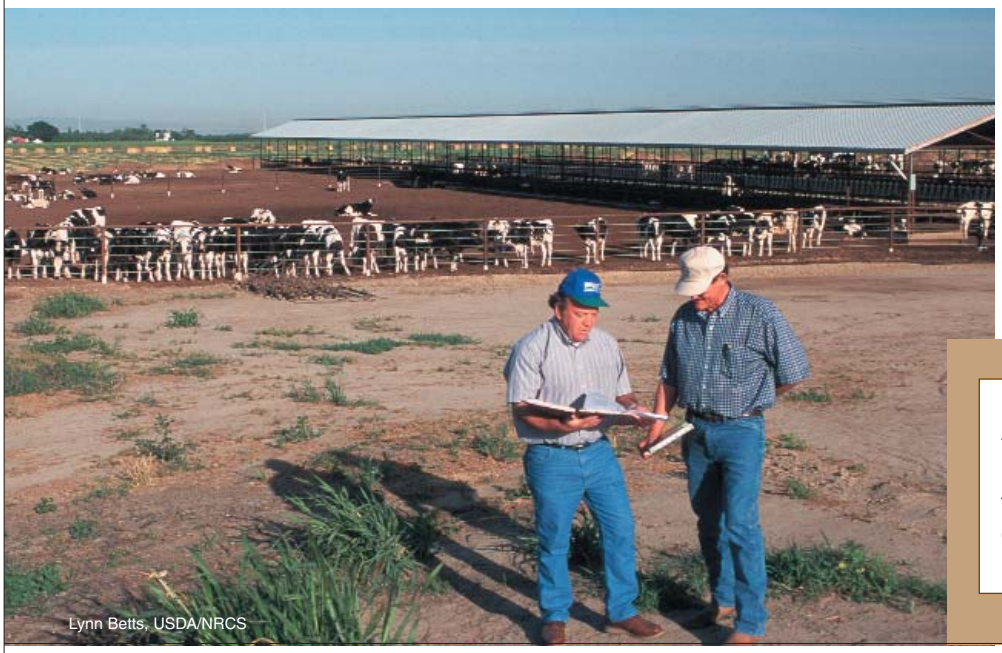
Pollution from agriculture generally has characteristics that make it difficult to control through conventional policy tools.

Putting the Brakes on Agricultural Emissions

Agricultural production releases a wide variety of material into the air—for example, windblown soil, nitrogen gases from fields and livestock, fine particulates from diesel engines and controlled burning of fields, and pesticides. Pesticides can move in air currents in two ways: aerial drift (when applied with crop dusters), and volatilization (a process by which solids or liquids are converted into gases). Other potential pollutants associated with agricultural production include hydrogen sulfide, ammonia, odors, and other volatile organic compounds from animal manure; methane from dairy cows and cattle; and nitrogen oxides from fertilized fields and internal combustion engines. These pollutants can affect people's health, reduce visibility, contribute to global warming, or simply be a nuisance.

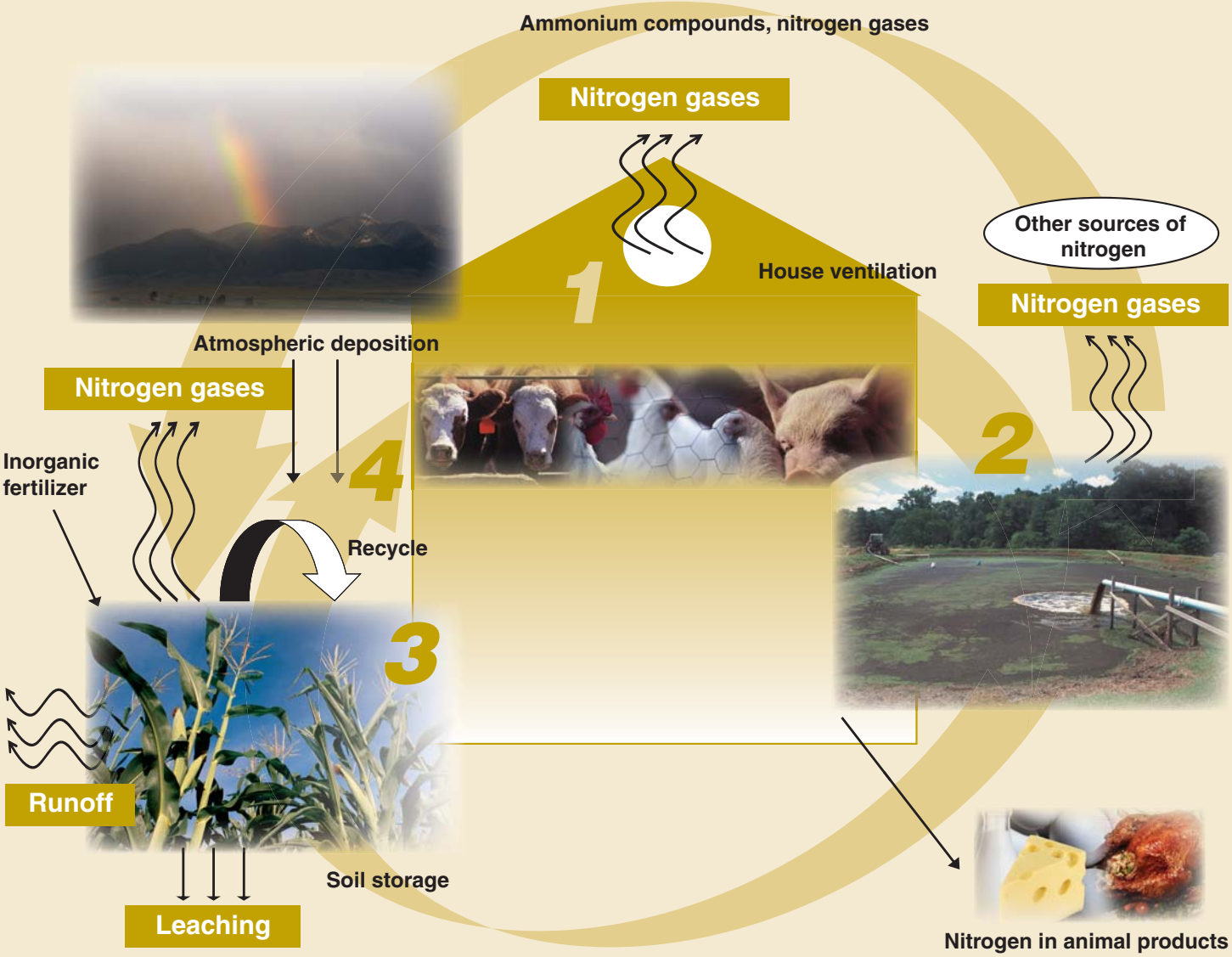
Air quality is protected primarily through the Clean Air Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Clean Air Act sets limits on how much of a pollutant can be in the air anywhere in the United States. When the air quality standard for any of six air pollutants is exceeded, States must inform the U.S. Environmental Protection Agency (EPA) how they plan to respond. Any farm in a nonattainment region (regions where air quality standards are exceeded) found to be a "major source" of regulated emissions could be required to apply for and comply with an operating permit. CERCLA requires facilities to report to EPA when more than a "reportable quantity" (100 pounds in a 24-hour period) of a hazardous substance is released.

Regulation of air emissions under the Clean Air Act and CERCLA has focused on such sources as factories and cars but not on emissions from agriculture. Part of the reason is a lack of information about the sources and effects of agricultural air emissions that would be necessary to develop regulations. Pollution from agriculture generally has characteristics that make it difficult to control through


Lynn Betts, USDA/NRCS

A California dairy farmer discusses manure management with an official from USDAs Nat ural Resources Conservation Service.

Nitrogen Follows Many Pathways in a Livestock Operation



The nitrogen cycle is a complex one, without a beginning, middle, or end. The principle of mass-balance ensures that the amount of nitrogen in a closed system is constant. Thus, any action to divert it from one pathway must necessarily transfer it into another. In this stylized figure:

1 animals in the "house" release nitrogen in three ways: they produce manure (which then enters a storage system); they store nitrogen internally, which is bound in animal products distributed to markets; and they produce gases (directly and indirectly in manure production), which are released as air emissions;

2 manure is stored in lagoons, tanks, pits, or other structures before being transported to fields for use as fertilizer;

3 manure nitrogen applied to fields may be stored in the soil, leached into groundwater, run off into surface water, volatilized into air emissions, and be bound in crops; or

4 nitrogen bound in crops may be used for feed for the animals, and the cycle begins again.

Nitrogen also enters and exits the system through intermediate pathways, for example, some of the nitrogen released into the air will settle back on the fields (deposition) and some new nitrogen will be added in the form of commercial fertilizer.

conventional policy tools that are applied to industrial sources. Agricultural emissions tend to be generated diffusely over a broad land area, rather than from a single pipe or smokestack, so it has not been cost effective to accurately monitor emissions from individual agricultural sources using current technology. For example, ammonia emissions from an animal operation can come from a barn, manure storage structure, and field. The difficulty and cost of monitoring agricultural pollution sources is one reason that agriculture is largely exempt from environmental regulations that were primarily designed to address urban and industrial air pollution problems.

However, new State regulations may seek to reduce air emissions from agriculture, particularly from animal feeding operations. Under the Federal Clean Air Act (and its amendments), States are responsible for achieving the air quality standards established by EPA. Recent lawsuits, court decisions, and consent agreements have induced States to start regulating emissions. California is the first State where air quality regulations are significantly affecting agriculture. Ozone and particulate levels in the San Joaquin Valley of California, which has some of the most polluted air in the country, with nonattainment areas for both Federal ozone and particulate matter standards, have led to new requirements for agricultural producers. Farmers must develop management plans showing how they will reduce dust, the burning of crop residue (e.g., rice straw, orchard trimmings) is restricted, and large dairies must manage their manure to reduce ammonia emissions.

California is the first State where air quality regulations are significantly affecting agriculture.

However, farmers do not bear the cost alone. USDA helps farmers in California's nonattainment areas with a cost-share program funded through the Environmental Quality Incentives Program to help finance farming practices that reduce airborne dust and ozone precursors. USDA also funds research to understand the processes of air pollution emissions from agricultural operations, to develop and test control measures, and to provide decision aids that can be used to reduce agricultural air pollution emissions.

Protect Air Quality, Compromise Water Quality?

An important issue in addressing pollution from agriculture is that emissions to the atmosphere do not necessarily occur in isolation, but can be linked by biological and chemical processes to emissions to water. Nitrogen emissions from animal feeding operations are the best example. Nitrogen excreted from an animal can follow any of a number of pathways between collection and disposal, and enter water or the atmosphere in the form of any of a number of compounds. These interactions have important consequences for policies to protect environmental quality. Reducing nitrogen movement along one pathway by changing its form will increase nitrogen movement along a different path. For example, reducing ammonia losses from a field by injecting animal waste directly into the soil increases the amount of nitrogen that can be made available for crop production, but, because more nitrogen is now available in the soil profile, the risk that nitrates will enter water resources is increased. The fact that these processes are linked requires that efficient management of manure consider

Corel

An uncoordinated approach between air and water policies could reduce water quality.

Animal feeding operations are a major source of ammonia emissions.

Bob Nichols & Jeff Vanuga, USDA/NRCS

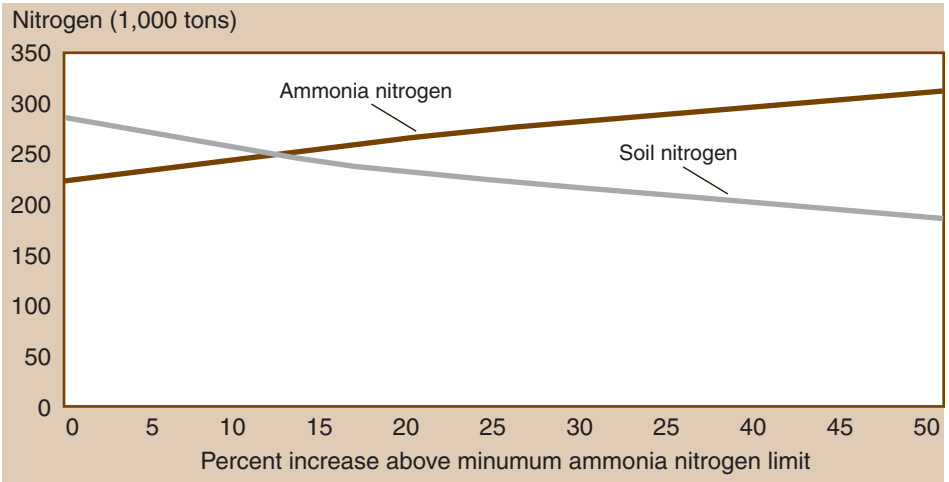
how different environmental media (that is, land, water, and air) are affected. (See box, "Nitrogen Follows Many Pathways in a Livestock Operation.")

Potential cross-media links in the emission process suggest possible advantages to a multimedia perspective in developing regulations. A multimedia perspective is neither new nor unique to agriculture. Many industries generate multiple pollutants that affect several environmental media. Yet, environmental regulations, by and large, take a single-medium perspective. The Clean Water Act addresses surface water quality (not ground water). The Clean Air Act addresses air quality. The Resource Conservation and Recovery Act (RCRA) addresses hazardous waste disposed on land.

Over the past decade, EPA has experimented with coordinated implementation of the Clean Air Act, Clean Water Act, and RCRA to reduce implementation costs and to help regulated industries organize pollution control activities more efficiently. The pulp and paper industry was the first to benefit from this multimedia approach. EPA developed integrated air and water rules that set emission levels based on the performance of a combination of source reduction technologies and management practices, air pollution control devices, and upgrades on existing wastewater treatment systems.

Why might a multimedia approach be important for agriculture? The increasing size and geographic concentration of animal feeding operations, driven by the economics of domestic and export markets for animal products, have resulted in large quantities of manure accumulating in relatively small areas. In 2003, EPA introduced revised Clean Water Act regulations to protect surface waters from nutrients from concentrated animal feeding operations (CAFOs). The regulations require CAFOs to follow a nutrient management plan to minimize nitrogen and phosphorus runoff to surface water. Those plans will specify the application rate for nutrients that must be followed when applying manure to land (the primary disposal method). The cost to farmers of complying with the plans can be relatively high because compliance often will entail moving manure to a larger land base. To meet the requirements as cheaply as possible, and without any incentives to protect air quality, farmers could continue to use (or adopt) uncovered lagoons and apply ani-

Steps farmers take to meet increasingly stringent ammonia emission reductions increase the amount of excess nutrients applied to fields



Farmers reduce ammonia emissions by putting a cover on lagoons that trap gaseous emissions or by injecting wet waste (slurry) into soil rather than spreading it on top. The right edge of the graph shows the situation when farmers emit 50 percent more ammonia than the best possible situations (all farmers cover their lagoons or inject slurry). At this point, farmers emit about 300,000 tons of ammonia-nitrogen, and apply about 200,000 tons of nitrogen to fields. As the amount of ammonia is reduced (moving from right to left), the amount of nitrogen applied to fields increases.

Source: USDA, Economic Research Service.

mal waste to the surface of fields without incorporating it into the soil. Those practices reduce the nitrogen content of manure spread on fields by volatilizing nitrogen to the atmosphere. In so doing, however, nitrogen that otherwise would be available for runoff to water bodies is transformed into atmospheric ammonia emissions to the possible detriment of air quality.

According to a 2003 National Academy of Sciences study, animal feeding operations are the primary source of ammonia emissions in the U.S., and ammonia emissions are already a cause for concern in some rural communities. Ammonia emissions are regulated in parts of California. Current Federal air quality rules (e.g., Clean Air Act's PM 2.5 standards and CERCLA) might force more States to consider regulating ammonia emissions from animal operations.

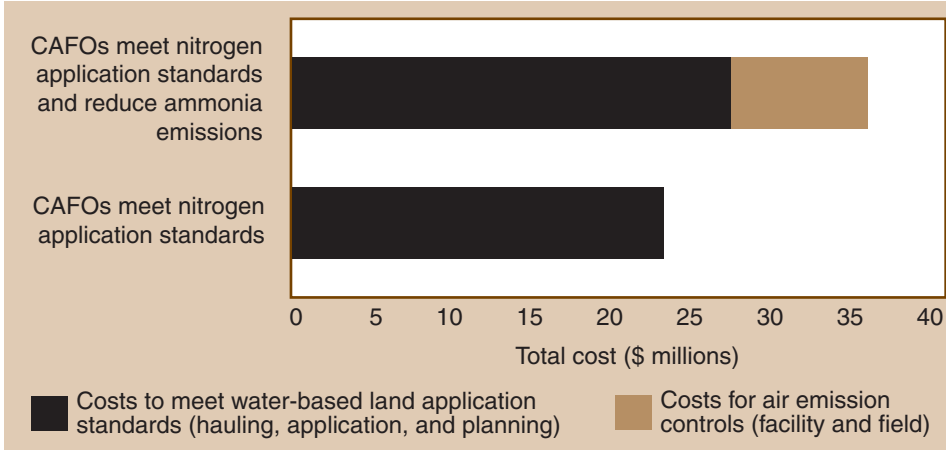
An ERS study estimates that farmers would respond to hypothetical ammonia emission standards by adopting manure management practices that reduce nitrogen emissions to the air but increase the nutrient content of animal waste spread on fields. Depending on how the air quality regulations were applied, this could have two impacts on CAFOs and water quality. First, CAFOs might need to further increase the amount of land on which they spread manure in order to continue to meet nutrient application standards. This increase could be particularly costly in a region where animal concentrations are high and cropland available for spreading manure is relatively scarce. For example, in the Chesapeake Bay watershed, ERS found that requiring CAFOs to adopt practices that reduce ammonia emissions would increase the nitrogen content of manure and thus the CAFOs' cost of applying manure to land to meet water quality requirements.

Information on environmental emissions from production practices would improve coordination of environmental policies.

An uncoordinated approach between air and water policies could also reduce water quality. The Clean Water Act's manure regulations apply only to CAFOs. If ammonia reductions are required on farms other than CAFOs, the water quality benefits of the CAFO regulations are potentially reduced by increased nutrient applications on these other farms. In the Chesapeake Bay watershed, for example, ERS research estimates that the nutrient content of manure produced on farms not covered by current regulations would more than double if ammonia restrictions were applied to all animal feeding operations. This would increase the risk of nitrogen runoff that eventually reaches the Chesapeake Bay.

USDA has long recognized the impacts of conservation practices on multiple environmental resources (soil, water, and air). Yet, when a set of conservation practices is recommended to improve water quality, full consideration is not always given for accompanying air quality benefits. In the Conservation Reserve Program, for example, the Environmental Benefits Index used to rank applications for enrollment includes wind erosion benefits but not benefits for reduced ammonia, odor, fine particulates, oxides of nitrogen, or pesticide volatilization. A fuller accounting of the multimedia benefits in the implementation of conservation programs could result in a redirection of resources to producers who could provide a higher level of overall environmental quality for a given cost.

Reducing ammonia emissions would increase costs of meeting nitrogen applications standards to CAFOs*



*CAFOs are concentrated animal feeding operations, or those operations regulated by EPA under the Clean Water Act.

Source: USDA, Economic Research Service.

Jeff Vanuga, USDA/NRCS

Better Data for Better Coordination

Information on environmental emissions from production practices would improve coordination of environmental policies. The National Academy of Sciences review of air emissions from animal feeding operations found that, while pressure to regulate air emissions from animal operations has mounted, the basic scientific information needed for effective regulation and management of emissions is lacking. The study was requested jointly by EPA and USDA to assess the state of knowledge and to recommend steps for bridging the information gap that is hindering the development of effective regulations and management measures. Existing data are insufficient to establish thresholds for emissions from livestock operations that would trigger compliance with air quality requirements.

This need for better data about air emissions from animal feeding operations has led to an innovative agreement between EPA and some sectors of the animal industry to monitor air quality on farms. The Air Emissions Consent agreement and National Monitoring Study between pork and egg producers and EPA calls for a 2-year national air monitoring study on animal feeding operations that agree to participate in the study. The study will use state-of-the-art technologies and standardized procedures to monitor emissions from barns and lagoons. These data will help State and Federal regulators and farmers identify farm sizes and manure handling systems that exceed thresholds for regulated pollutants. For farms that participate, EPA has agreed to provide certain legal protections for past and current emissions violations. EPA has invited other sectors of the animal industry (broilers, dairy, and fed beef) to participate.

The information gathered during the study will be valuable for both farmers and regulators. Many producers are not aware of their operation's contribution to emissions or whether they are subject to existing air quality regulations. Knowing the legal and financial risks for different types of operations would help farmers make decisions about reducing emissions to protect them from possible lawsuits or enforcement actions and still remain profitable.

Information on atmospheric emissions from agriculture can help regulators identify the emission thresholds that meet air quality goals at minimum cost to the sector and develop coordinated incentives to help farmers simultaneously protect air and water quality. This would reduce unintentional harm to the environment because of unconsidered cross-media effects and minimize the cost to producers who change their production practices to comply with emerging environmental regulations.

This article is drawn from . . .

Managing Manure To Improve Air and Water Quality, by Marcel Aillery, Noel Gollehon, Robert Johansson, Jonathan Kaplan, Nigel Key, and Marc Ribaudo, ERR-9, USDA, Economic Research Service, September 2005, available at: www.ers.usda.gov/publications/err9/

Data may have been updated since publication. For the most current information, see www.ers.usda.gov/publications/agoutlook/aotables/.

Farm, Rural, and Natural Resources Indicators

	1990	2000	2001	2002	2003	2004	Annual percent change 1990-2000	2002-03	2003-04
Cash receipts ($ billion)	169.5	192.1	200.1	195.1	211.6	235.4f	1.3	8.5	11.2
Crops	80.3	92.5	93.4	101.3	106.2	113.2f	1.4	4.8	6.6
Livestock	89.2	99.6	106.7	93.8	105.5	122.2f	1.1	12.5	15.8
Direct government payments ($ billion)	9.3	22.9	20.7	11.0	15.9	14.5f	9.4	44.5	-8.8
Gross cash income ($ billion)	186.9	228.7	235.6	222.0	243.9	266.1f	2.0	9.9	9.1
Net cash income ($ billion)	52.7	56.7	59.5	50.7	68.6	77.8f	0.7	35.3	13.4
Net value added ($ billion)	80.8	91.9	94.1	78.8	101.4	118.0f	1.3	28.7	16.4
Farm equity ($ billion)	702.6	1,025.6	1,070.2	1,110.7	1,180.8	1,247.0f	3.9	6.3	5.6
Farm debt-asset ratio	16.4	14.8	14.8	14.8	14.4	14.2f	-1.0	-2.7	-1.4
Farm household income ($/farm household)	38,237	61,947	64,117	65,757	68,506	71,102f	4.9	4.2	3.8
Farm household income relative to average U.S. household income (%)	103.1	108.6	110.2	113.7	na	na	0.5	na	na
Nonmetro-Metro difference in poverty rate (% points)	3.6	2.6	3.1	2.6	2.1	na	-3.2	-19.2	na
Cropland harvested (million acres)	310	314	311	307	315	312.0p	0.1	2.6	-1.0
USDA conservation program expenditures ($ bil.)[1]	3.0	3.3	3.7	4.2	4.3	5.1	1.0	2.4	18.6

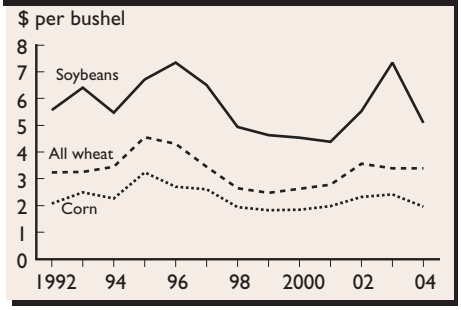
Food and Fiber Sector Indicators

U.S. gross domestic product ($ billion)	5,803	9,817	10,128	10,470	10,971	11,734	5.4	4.8	7.0
Food and fiber share (%)	7.9	5.8	5.8	5.8	4.9	na	-3.0	15.5	na
Farm sector share (%)	1.3	0.7	0.7	0.7	0.8	na	-6.0	14.3	na
Total agricultural imports ($ billion)[1]	22.7	38.9	39.0	41.0	45.7	52.7	5.5	11.5	15.3
Total agricultural exports ($ billion)[1]	40.3	50.7	52.7	53.3	56.2	62.3	2.3	5.4	10.9
Export share of the volume of U.S. agricultural production (%)	18.2	17.6	17.7	16.5	17.9	na	-0.3	8.5	na
CPI for food (1982-84=100)	132.4	167.9	173.1	176.2	180.0	186.2	2.4	2.2	3.4
Share of U.S. disposable income spent on food (%)	11.2	10.1	10.2	10.1	10.1	na	-1.0	0.0	na
Share of total food expenditures for at-home consumption (%)	55.4	53.3	53.9	53.8	53.1	na	-0.4	-1.3	na
Farm-to-retail price spread (1982-84=100)	144.5	210.3	215.4	221.2	225.6	232.9	3.8	na	na
Total USDA food and nutrition assistance spending ($ billion)[1]	24.9	32.6	34.2	38.0	41.8	46.2	2.7	10.0	10.5

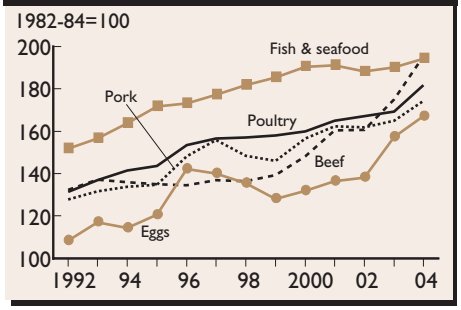
f = Forecast. p = Preliminary. na = Not available.

[1] Based on October-September fiscal years ending with year indicated.

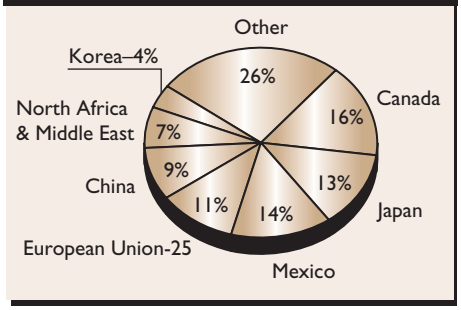
U.S. average prices received by farmers for wheat, corn, and soybeans



Consumer price indexes for high-protein foods consumed at home



Major markets for U.S. agricultural exports in 2004 ($61.3 billion total)



For more information, see www.ers.usda.gov/amberwaves/

Behind the Data

Estimating the Raw-Fiber Equivalent of U.S. Cotton Textile and Apparel Imports

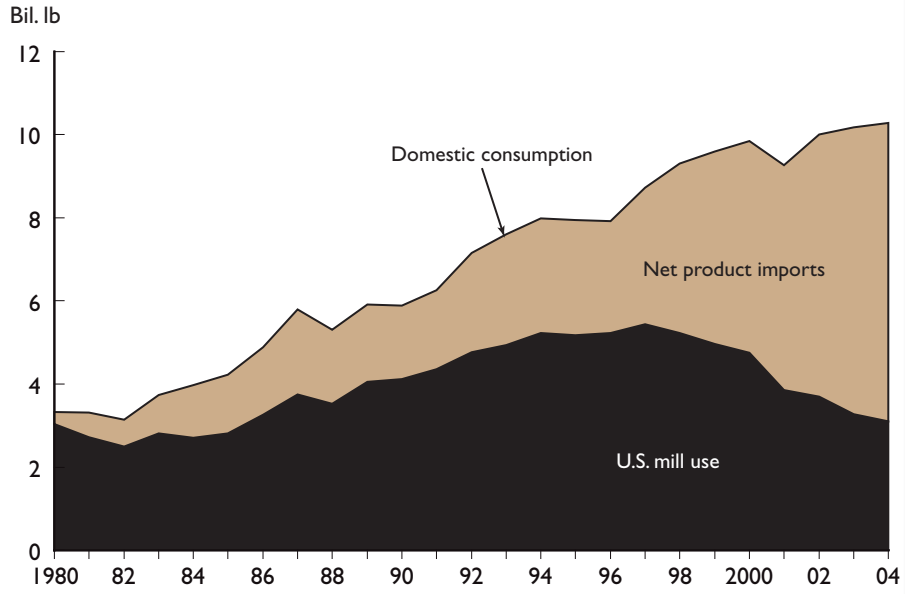
The U.S. retail market for cotton textile and apparel products is the largest in the world, doubling in size during the past two decades. However, much of this growth is attributable to imports, as U.S. cotton mill use has contracted. Measuring the amount of raw fiber contained in textile and apparel trade is essential in estimating U.S. fiber consumption and for assessing effects on U.S. industry.

The data behind the ERS raw-fiber equivalent estimates come from product-specific shipment volumes collected by the U.S. Department of Commerce. More than 3,000 different textile and apparel products containing cotton are imported by the U.S. annually and are converted to raw-fiber equivalents using factors developed by ERS. These conversion factors adjust the weight of each textile and apparel product to account for the estimated share of cotton in the product, as well as the processing and manufacturing losses associated with producing the item. The raw-fiber equivalent data are then aggregated into major categories, such as apparel, and totaled on a monthly or annual basis for further analysis. USDA provides raw-fiber equivalent data totals back to 1960, and ERS began estimating country-specific data in the 1980s.

In 2004, the U.S. imported the equivalent of 9.5 billion pounds of raw cotton in the form of textile and apparel products, a record, with apparel accounting for 73 percent of the total. At the same time, U.S. mills used 3.1 billion pounds of cotton fiber and the U.S. exported about 2.3 billion pounds in the form of products. Although over 150 countries are involved in trade with the U.S., that trade is highly concentrated. The top five exporters to the U.S. (China, Mexico, Pakistan, Honduras, and India) accounted for 44 percent of total U.S. cotton product imports in 2004.

Import expansion has continued in 2005 as the complete removal of quotas in January allowed greater access to the U.S. market. With trade preferences diminished and many countries no longer having a guaranteed market, the more efficient countries are likely to increase their market shares, resulting in further concentration. Early 2005 data show that volume and share patterns have altered. The top five countries now account for half of the U.S. cotton textile and apparel import market, with China benefiting the most in the new "quota-free" environment.

U.S. domestic consumption of cotton



Source: Compiled by USDA, Economic Research Service from U.S. Census Bureau data.

Raw-fiber equivalent—The amount of raw fiber needed (including associated processing and manufacturing losses) to produce a specific finished product.
Textile products—Items of yarn or fabric.
Domestic consumption—The sum of U.S. fiber mill use plus the raw-fiber equivalent of imports minus the raw-fiber equivalent of exports.
Mill use—The amount of fiber initially used to produce textile and apparel products.

Leslie A. Meyer, lmeyer@ers.usda.gov

This article is drawn from….

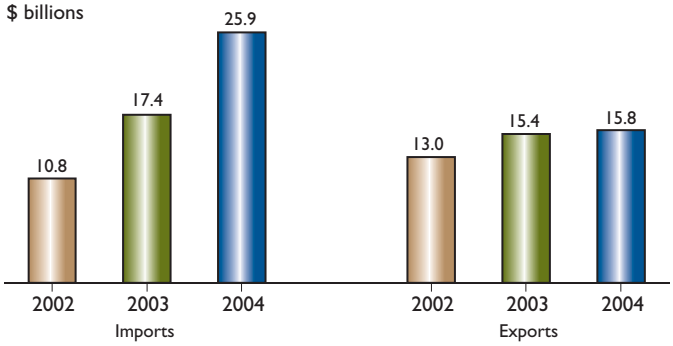
The Forces Shaping World Cotton Consumption After the Multifiber Arrangement, by Stephen MacDonald and Thomas Vollrath, CWS-05c-01, April 2005, available at: www.ers.usda.gov/publications/cws/apr05/cws05c01/

Cotton and Wool Outlook, available at: www.ers.usda.gov/publications/so/view.asp?f=field/cws-bb/

ERS Cotton Briefing Room, www.ers.usda.gov/briefing/cotton/

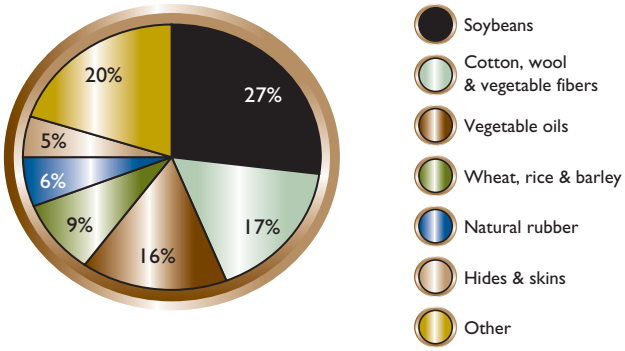
Markets and Trade

China's agricultural imports more than doubled between 2002 and 2004



Source: Calculations by ERS using China Customs Statistics and USDA, Foreign Agricultural Service data.

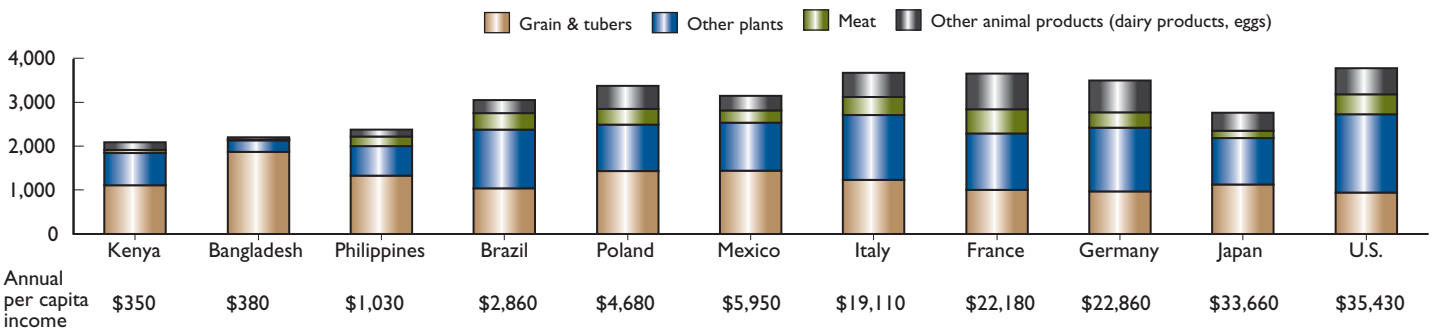
Soybeans are more than one-quarter of China's agricultural imports, 2004



Note: Based on U.S. dollar value of imports.
Source: China Customs Statistics reported by Global Trade Information Systems, Inc.

Diet and Health

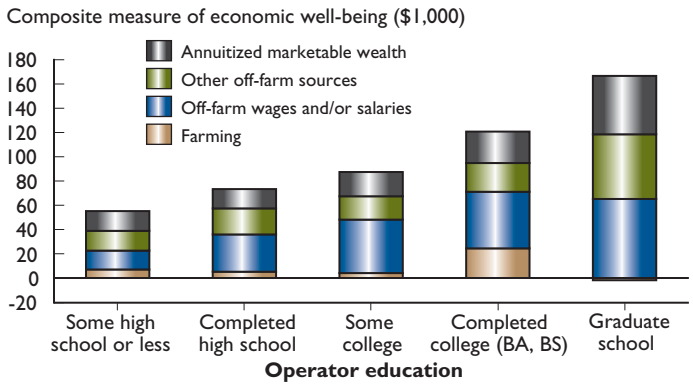
Diets diversify as incomes rise



[1]Actual consumption is less than total food availability.
Source: Calorie data from FAOSTAT 2005 and income data from World Bank's World Development Indicators, 2005.

Farms, Firms, and Households

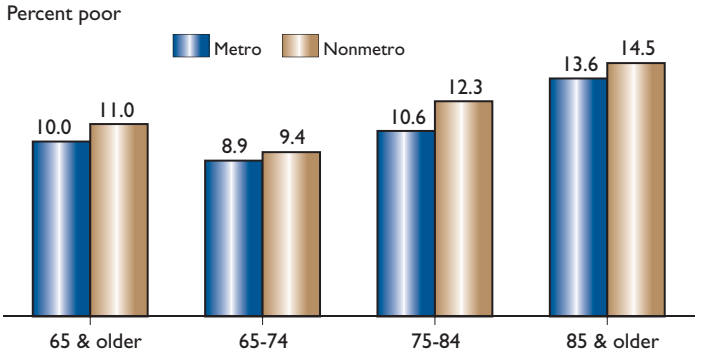
Farm households with graduate school education have the highest level of economic well-being and receive nearly all of their income from off-farm sources



Source: USDA's 2003 Agricultural Resource Management Survey.

Rural America

The oldest old—age 85 and older—had the largest share who were poor, 2003



Source: Calculations by ERS from the March 2004 Current Population Survey.

On the Map

Certified organic handling facilities concentrated on Pacific Coast

Just over 3,000 organic handling facilities—facilities that process and distribute organic products—were certified to USDA standards to handle organic products in 2004. These facilities are heavily concentrated on the Pacific Coast (41 percent of the total). Nearly 800 were in California. In contrast, over half the States, mainly in the Southeast, the Midwest, and the Mountain States, had 30 or fewer facilities.

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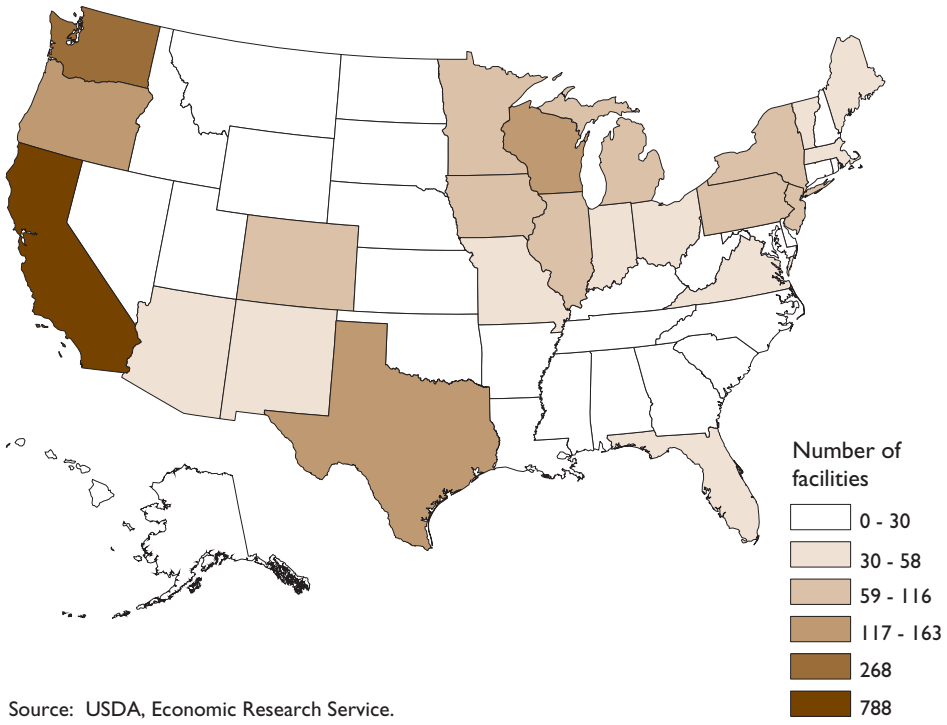
cdimitri@ers.usda.gov

Lydia Oberholtzer,
loberholtzer@ers.usda.gov

Certified organic handling facilities in the U.S., 2004



Source: USDA, Economic Research Service.

In the Long Run

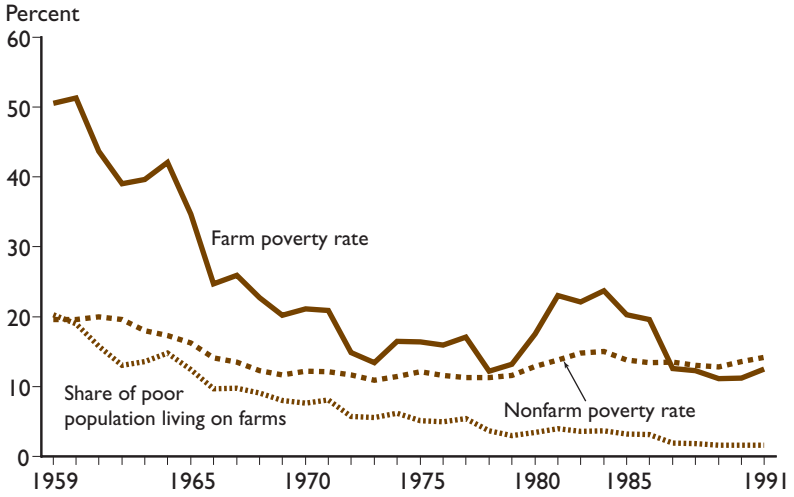
Another look at farm poverty

With the initiation of an official definition of poverty in the mid-1960s, the U.S. Census Bureau calculated poverty rates for the U.S. population starting from 1959, including the population that lived on farms. Calculations of the poverty rate for the farm population were discontinued after 1991, when the concept became less valid because many farmers had shifted their residences to town.

In the late 1950s, half of the people living on farms were in poverty. The rate fell steeply through the 1960s and 1970s, with a marked but temporary increase during the farm crisis of the 1980s. By 1991, the last year it was estimated by the Census Bureau, the rate was 12.5 percent. Using 2000 Census data, ERS estimated the poverty rate for people living on farms at 9.7 percent.

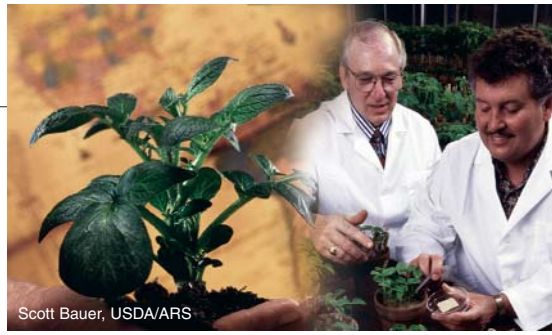
Susan Offutt, soffutt@ers.usda.gov

Farm and nonfarm poverty, 1959-91



Note: No data are available for 1984, because of the introduction of a new sample design in the Current Population Survey.

Source: U.S. Census Bureau, various years.


Scott Bauer, USDA/ARS

Current Activities

U.S. Food Security Measurement Methods Adapted for Use in Other Countries

In 1995, the United States became the first country to measure and monitor household food security (access to enough food for active healthy living) at a national level. Since then, ERS—which plays a leading role in U.S. household food security measurement—has provided technical assistance to researchers interested in adapting the U.S. methods for use in other countries, including Brazil, India, Israel, Bangladesh, Portugal, and Burkina Faso. Earlier this year, ERS sociologist Mark Nord described lessons learned from measuring U.S. food security to nutritionists and social scientists from Israel, Palestine, and the United States at a conference jointly sponsored by Ben-Gurion University of the Negev (Israel), the conference site; Al Quds University (Palestine); and Tufts University (United States). Conference participants met to plan collaborative research on child nutrition in Israel and Palestine and considered, among other issues, the role food security measurement could play in improving child nutrition. **Mark Nord, marknord@ers.usda.gov**

Interagency Group Discusses the International Treaty on Plant Genetic Resources

In June 2005, a U.S. interagency group met with representatives from Canada in Washington, DC, to discuss developments related to the International Treaty on Plant Genetic Resources for Food and Agriculture. The treaty governs the exchange of germplasm of 35 crops and 29 genera of forages. Though the Treaty entered into force on June 29, 2004, the lack of a standard Material Transfer Agreement (MTA) has left uncertain the terms of germplasm exchange. The group—which included representatives from ERS, other USDA agencies, and the State Department—discussed issues and proposals regarding MTAs for the upcoming First Meeting of the Contact Group on the Terms of the Standard Material Transfer Agreement, scheduled for August in Hammamet, Tunisia. The standard Material Transfer Agreement will play a key role in determining future germplasm exchange among parties to the Treaty. The U.S has signed, but not yet ratified, the treaty. **Kelly Day Rubenstein, kday@ers.usda.gov**

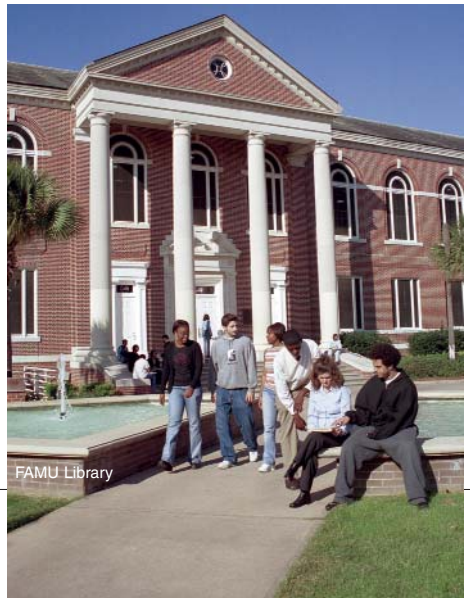
Recent Meetings

Globalization and Restructuring in Rural America

In June 2005, ERS and Farm Foundation hosted a workshop in Washington, DC, on "Globalization and Restructuring in Rural America." Technological breakthroughs, changes in consumer preferences, and global factors have transformed how and where goods are produced. In addition, industries that once evolved over a generation to meet new competitive challenges are now expected to restructure every few years. The critical policy challenge is finding ways to smooth the progress of welfare-enhancing structural change while reclaiming the productive potential of workers and communities bearing the costs of job loss and local economic contraction. This workshop brought together community leaders, policy officials, program administrators, and researchers concerned with rural economy issues, displaced worker issues, and trade issues. Participants gained a broader understanding of how global economic forces impact rural communities, and how government responses might assist in economic restructurings. Papers are available at: www.farmfoundation.org/projects/05-22restructuringofruralamerica.htm **Karen Hamrick, khamrick@ers.usda.gov**

Bridging the Gap—1890 and 1862 Land Grant Institutions

In June 2005, ERS hosted a workshop, "Bridging the Gap Between 1890 and 1862 Land Grant Institutions' Agricultural Economics Programs," sponsored by the Committee on the Opportunities and Status of Blacks in Agricultural Economics, a section of the American Agricultural Economics Association. Funded by ERS and USDA's Cooperative State Research, Education, and Extension Service, the workshop focused on the state of agricultural economics in 1890, 1862, and other private institutions; the under-representation of minorities in graduate agricultural economics programs, academia, and other research professions; and strategies to bridge the gap between the various institutions' teaching, research, and extension programs. Workshop participants developed a series of recommendations aimed at fostering collaboration among institutions in research, teaching, and extension. **Christopher Davis, chrisdavis@ers.usda.gov**, and **Keithly Jones, kjones@ers.usda.gov**


FAMU Library

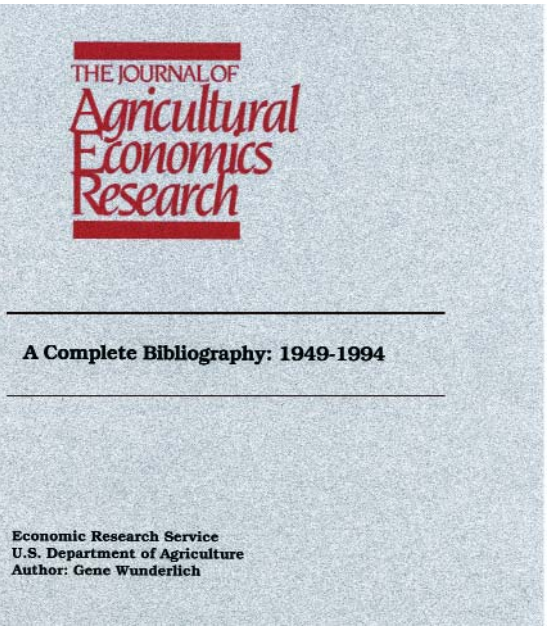
Farm and Rural Economies Face Challenges

In June 2005, ERS and the National Center for Food and Agricultural Policy co-sponsored a workshop entitled "Farm Policy and the Rural Economy: Alternative Approaches to the Economic Challenges," in Washington, DC. Researchers and policymakers discussed the impact of traditional farm policy on farm households and the rural economy, explored new approaches to farm and rural development policy, and framed key issues that will be considered in the next farm bill. Workshop presentations are available at: www.ncfap.org. **Betsey Kuhn, bkuhn@ers.usda.gov**

New Releases

On the Shoulders of Giants

Between 1949 and 1994, ERS and its predecessor agencies published the quarterly *Journal of Agricultural Economics Research* to disseminate technical discussion of economic issues, analyses, and measurement. ERS recently released a bibliography of all the articles and reviews that appeared in the *Journal* (www.ers.usda.gov/publications/jaer/), compiled by Gene Wunderlich, one of the *Journal's* editors. A number of distinguished scholars graced the *Journal's* pages over its 45 years. You can form your own Who's Who list by scanning the index of contributors, as Don Paarlberg did in a 1988 article, citing Fred Waugh, Marc Nerlove, and Karl Fox on statistical methods; George Walter and Ray Anderson on soil and water conservation; Harry Norcross and Clark Edwards on macroeconomics; Allen Paul on agribusiness; Harold Breimyer on livestock; Calvin Beale on demographics; Sherman Johnson and D. Gale Johnson on foreign development; Alex McCalla on trade; and the list goes on. **Thomas McDonald, thomasm@ers.usda.gov**



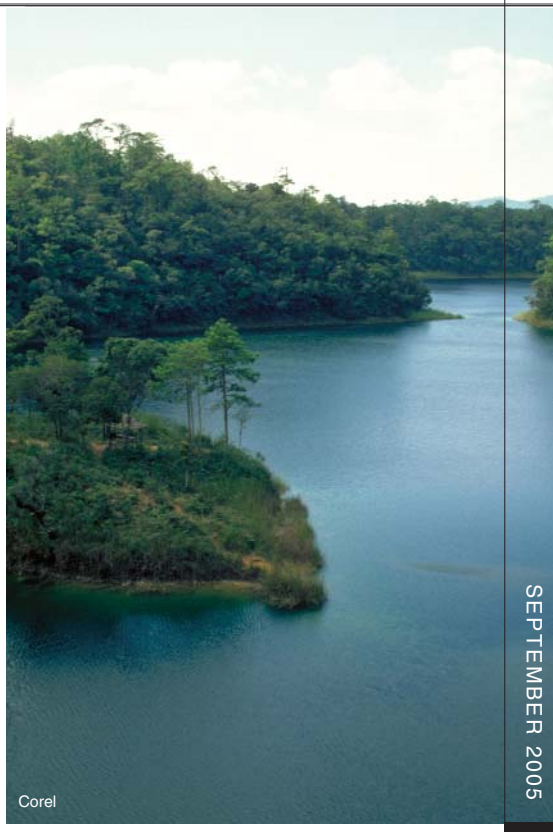
Comprehensive China Database

China Agricultural and Economic Data (www.ers.usda.gov/data/china/) is the world's most comprehensive English-language online collection of agriculturally related statistics for China. ERS has assembled in a single database 250 data items at the national level and 45 items at the provincial level, which can be downloaded in various formats. Included are statistics on agricultural production, food consumption, macroeconomics, prices, and industrial output in China, one of the world's most important agricultural economies. Many series go back as far as 1949, and the most recent data currently available are for 2003. **Fred Gale, fgale@ers.usda.gov**

Many Factors Influence Overweight and Obesity

In "Dietary Habits, Demographics, and the Development of Overweight and Obesity among Children in the United States" (*Food Policy*, 30(April 2005):115-128), researchers from ERS, Southern Arkansas University, the University of Georgia, and the University of Florida examined the factors that influence overweight and obesity among school-age U.S. children using data from USDA's 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals. Black and Hispanic children seem more likely to be at risk for being overweight. Poverty is also associated with the likelihood of overweight among school-age children. Frequency of physical exercise was positively associated with normal weight. Sedentary behavior was negatively associated with normal weight and positively associated with overweight among children ages 12-18. The consumption of low-fat milk, other dairy products, fruits, and legumes is negatively associated with risk for overweight and obese. In contrast, increasing consumption of soft drinks, fats and oils, and sodium appears to be the major dietary factors that are positively associated with childhood overweight. **Biing-Hwan Lin, blin@ers.usda.gov**

The citations here and in the rest of this edition are just a sample of the latest releases from ERS. For a complete list of all new ERS releases, view the calendar on the ERS website: www.ers.usda.gov/calendar/



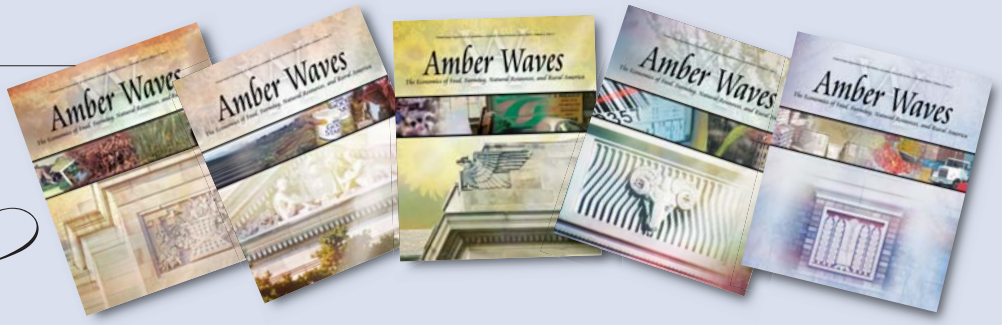
New Environmental Quality Incentives Program Data

USDA's Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance to producers for a wide range of agri-environmental activities. ERS's EQIP database (www.ers.usda.gov/data/eqip/), updated in June 2005, presents an overview of which conservation practices are being funded, preliminary estimates of unit costs for the most commonly contracted conservation practices, and a comparison of unit costs for different contract sizes to determine the extent to which economies of scale exist practice by practice. All results are presented at the national level, for ERS Farm Resource Regions, and for ERS Farm Production Regions. Allocation of EQIP funds is also broken down by State. **Rob Johansson, rjohanss@ers.usda.gov**

Commodity Markets and Trade

ERS Outlook reports provide timely analysis of major commodity markets and trade, including special reports on hot topics. All reports are available electronically and can be found at www.ers.usda.gov/publications/outlook/, along with a calendar of future releases. **Joy Harwood, jharwood@ers.usda.gov**

Amber Waves Awards



Each year, the *Amber Waves* Editorial Board and an external committee of distinguished judges select the best articles—features, findings, data feature, and indicator item—of the year. The 2004 honorees received their awards at a ceremony in April, along with the winners of the inaugural Helios Awards (see *Amber Waves*, June 2005, Volume 3, Issue 3). ERS congratulates the winners and the many other ERS staffers who supported these award-winning articles.

Best Feature

Winner

(l to r): Stacey Rosen and Shahla Shapouri

"Fifty Years of U.S. Food Aid and Its Role in Reducing World Hunger"
(September 2004)

Honorable Mention

(l to r): David McGranahan, Patrick Sullivan, Daniel Hellerstein, and Stephen Vogel

"Farmland Retirement's Impact on Rural Growth"
(November 2004)

Best Findings

Winners

(l to r): Fred Kuchler, Janet Perry, Stan Daberkow, and Dean Jolliffe
(Not pictured): James M. MacDonald

"Taxing Snacks To Reduce Obesity"
(November 2004, Fred Kuchler)
"Contract Use Continues To Expand"
(November 2004, James M. MacDonald & Janet Perry)
"Economic Risks of Soybean Rust in the U.S. Vary by Region"
(September 2004, Stan Daberkow)
and "Persistent Poverty Is More Pervasive in Nonmetro Counties"
(September 2004, Dean Jolliffe)

Best Data Feature & Indicator

Winners

(l to r): Stephen MacDonald, Marlow Vesterby, Kenneth S. Krupa, Thomas Vollrath, and Mark Gehlhar

"The Changing World Network of Trade in Textiles and Apparel"
(September 2004, Thomas Vollrath, Mark Gehlhar, & Stephen MacDonald)
and
"Estimating U.S. Cropland Area"
(November 2004, Marlow Vesterby & Kenneth S. Krupa)

Photos: Ken Hammond, USDA